FCB VIPER

Service Manual

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The products, technical information, and instructions contained in this manual are subject to change without notice. These instructions are not intended to cover all details or variations of the equipment, nor to provide for every possible contingency in the installation, operation or maintenance of this equipment. This manual assumes that the person(s) working on the equipment have been trained and are skilled in working with electrical, plumbing, pneumatic, and mechanical equipment. Appropriate safety precautions should be followed and all local safety and construction requirements should be met.

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INTRODUCTION

MANUAL OVERVIEW

The organization of this manual allows the user to scan quickly to the subject of interest along the left side of a page and to read the detail about the subject or procedure on the right side of the page. The manual provides the detail needed for newcomers to the industry while allowing experienced technicians to skip over the details and move quickly through the material.

This manual is designed as a guide to the technician in maintaining and servicing the Viper system. The Viper system is simple in design and has built-in features and diagnostic controls to help the service technician quickly and accurately service the machine.

The unit consists of multiple freeze barrels that each contain an internal beater driven by a rear mounted electric motor, a refrigeration system, timer-controlled, automatic hot gas defrost system and interconnecting tubing and controls required to dispense the product.

Some of the system features and functions are listed below:

- Simple User Interface LCD Display
- Real Time Clock
- Incoming Line Voltage Sensing
- Pressure Sensing of Incoming Water, Syrup and CO_2
- System Error Handling
- Error Log
- Viscosity Control

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SAFETY

SAFETY INSTRUCTIONS

Read and Follow ALL Safety Instructions

Safety Overview

Read and follow ALL SAFETY INSTRUCTIONS in this manual and any warning/ caution labels on the machine (decals, labels or laminated cards).

Read and understand ALL applicable OSHA (Occupational Safety and Health Administration) safety regulations before operating this machine.

Recognition

Recognize Safety Alerts

This is the safety alert symbol. When you see it in this manual or on the machine, be alert to the potential of personal injury or damage to the machine.

Different Types of Alerts

Danger

Danger - Indicates an immediate hazardous situation which if not avoided **WILL** result in serious injury, death or equipment damage.

Warning

WARNING - Indicates a potentially hazardous situation which, if not avoided, COULD result in serious injury, death, or equipment damage.

Caution

CAUTION - Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury or equipment damage.

SAFETY TIPS

Carefully read all safety messages in this manual and safety signs on the machine.

Keep safety signs in good condition and replace missing or damaged items.

Do not let anyone operate the machine without proper training. This appliance is not intended for use by very young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.

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Keep your machine in proper working condition and do not allow unauthorized modifications to the machine.

QUALIFIED SERVICE PERSONNEL

CAUTION - Only trained and certified electrical, plumbing and refrigeration technicians should service this unit. ALL WIRING AND PLUMBING MUST CONFORM TO NATIONAL AND LOCAL CODES.

CO_2 (CARBON DIOXIDE) WARNING

WARNING - CO_2 Displaces Oxygen. Strict Attention **must** be observed in the prevention of CO_2 gas leaks in the entire CO_2 and soft drink system. If a CO_2 gas leak is suspected, particularly in a small area, **immediately** ventilate the contaminated area before attempting to repair the leak. Personnel exposed to high concentration of CO_2 gas will experience tremors which are followed rapidly by loss of consciousness and **death**.

SHIPPING AND STORAGE

CAUTION - Before shipping, storing, or relocating the Unit, syrup systems must be sanitized and all sanitizing solution must be purged from the syrup systems. All liquids, after sanitizing, must be purged from the unit. A freezing ambient environment will cause residual sanitizing solution or water remaining inside the Unit to freeze resulting in damage to the internal components.

MOUNTING ON A COUNTER

WARNING - When installing the unit on a counter top, the counter must be able to support a weight in excess of 450 lbs to insure adequate support for the unit.

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DISPENSED PRODUCT CONDITIONS

Overrun, as Applied to Carbonated Beverages

Overrun Definition

Overrun is defined as product expansion that takes place in the frozen carbonated drink. It is caused primarily by CO2 gas breakout and secondarily by freezing.

Overrun is a Variable

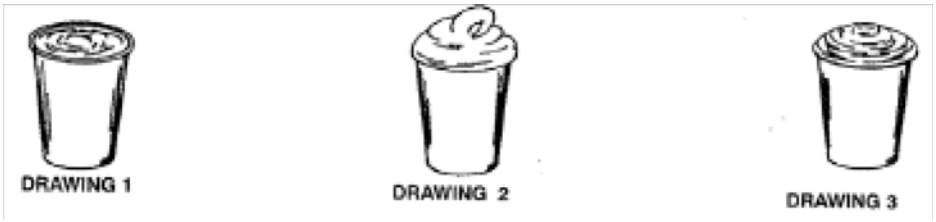
The percentage or degree of overrun depends on a number of factors. The specific syrup, BRIX, low dispensing volume, carbonation level in the liquid product and freezing of the product. These items all affect overrun. After these factors hav been considered, desired viscosity (product consistency) adjustment may be made on the unit. The viscosity adjustment adjusts product texture from very wet to light.

Specific Product Ingredients Affect Overrun

Each syrup has its own specific formulation of makeup. Fruit flavors contain citric acids that colas do not. Colas also differ in ingredients from one brand to another. Each product formulation has its own peculiarities regarding the way the product absorbs carbonation and the way it releases carbonation.

BRIX Affects Overrun

Sugar in carbonated drinks is like anti-freeze in water. The higher the BRIX, the greater the resistance of the product to freezing. Conversly, in products with lower BRIX, freezing takes place at higher termperatures than for high-BRIX products. Thus, BRIX affects overrun because the amount of sugar in a drink has a direct bearing on the product's freezing characteristics.



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Low Dispensing Volume Affects Overrun

When a unit sits idle fo a period of time with no drinks being dispensed, CO_2 gas in the system takes a “set”. When the first few drinks are drawn off after an idle period, CO_2 gas has less tendancy to break out as the drink is dispensed. The result is that these first drinks hav less overrun than drinks dispensed during peak-use periods.

Carbonation Level in Liquid Product Affects Overrun

The higher the specific carbonation level in a given product, the greater the potential for carbonation breakout in frozen carbonated form of that drink. For example, drinks with 3.0 volume of carbonation have more gass breakout in frozen carbonated form and more overrun than drinks that contain 2.0 volumes of CO_2 gas.

Freezing Affects Overrun

Freezing causes approximately a 5-7 percent expansion in dispensed frozen carbonated drinks. The degree of freezing is limited because the finished drink is intended to be sipped through a straw. This is not possible if the product is too “solid”.

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SYSTEM OVERVIEW

INTRODUCTION

The Viper unit consists of the following systems and hardware:

Multiple freeze barrels, each containing an internal scraper bar driven by an AC motor.

A refrigeration system and an intelligent, hot gas defrost system.

The components are enclosed in a powder-coated steel frame to prevent corrosion. It is covered with ventilated cladding panels and a lighted merchandiser. The cladding is easily removable to facilitate installation, service and maintenance.

Each barrel has a transparent faceplate, with an integral relief valve and a removable, self-closing dispensing valve mounted on the front. A removable drip tray, with cup rest is located directly below the dispensing valves.

A programmable control system with a control panel that controls operational and diagnostic functions and settings is located behind the merchandiser.

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THEORY OF OPERATION

The refrigeration system schematic is shown in Figure 1. It provides the basic configuration for the Viper refrigeration system.

The wiring diagram of the 2-Barrel Viper unit is shown in Figure 4, the wiring diagram of the 3-Barrel Viper unit is shown in Figure 5 and the wiring diagram of the 4-Barrel Viper unit is shown in Figure 6. These diagrams show the details of the electrical connections in the unit.

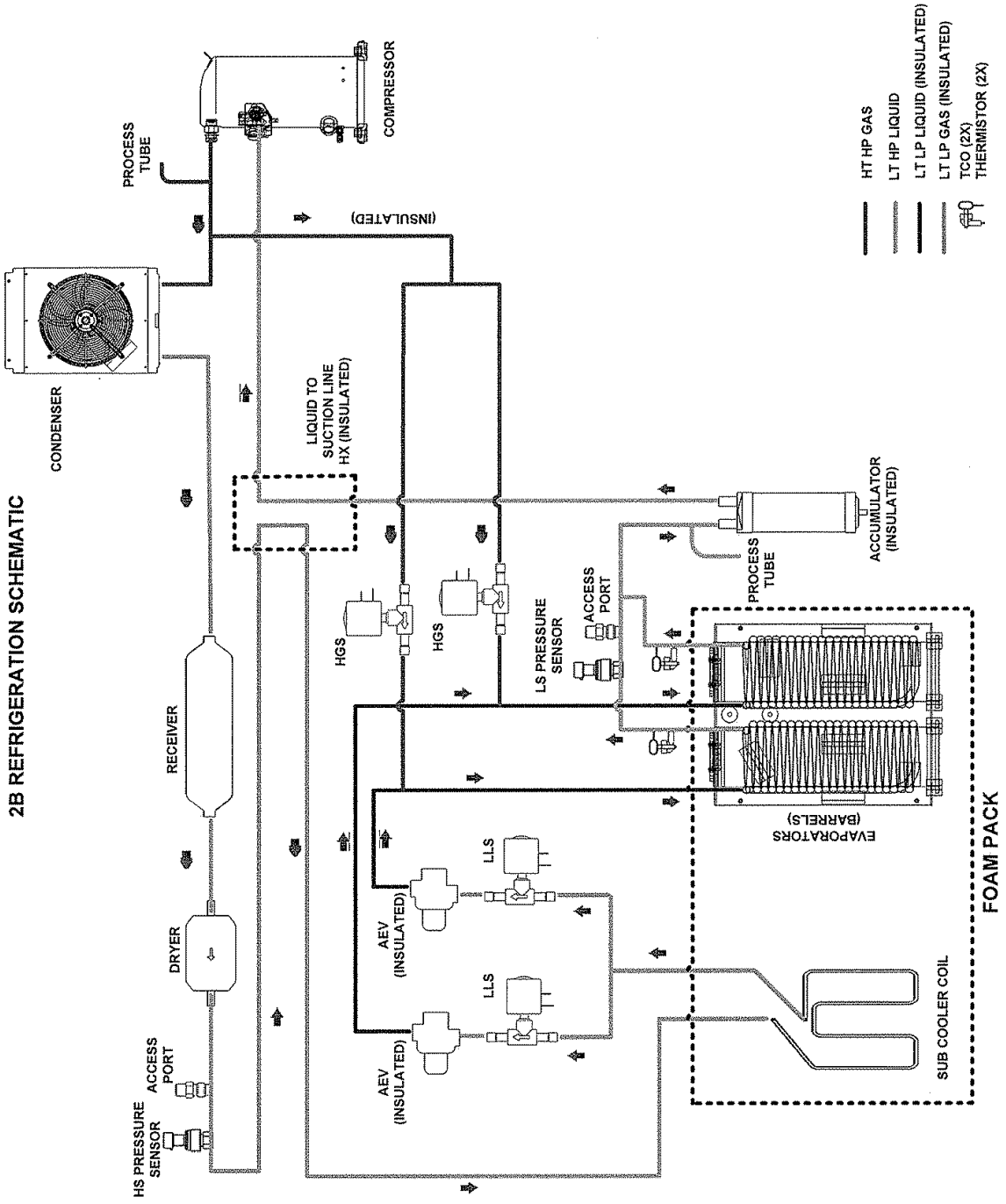

Figure 1. Viper System 2-Barrel Refrigeration Schematic

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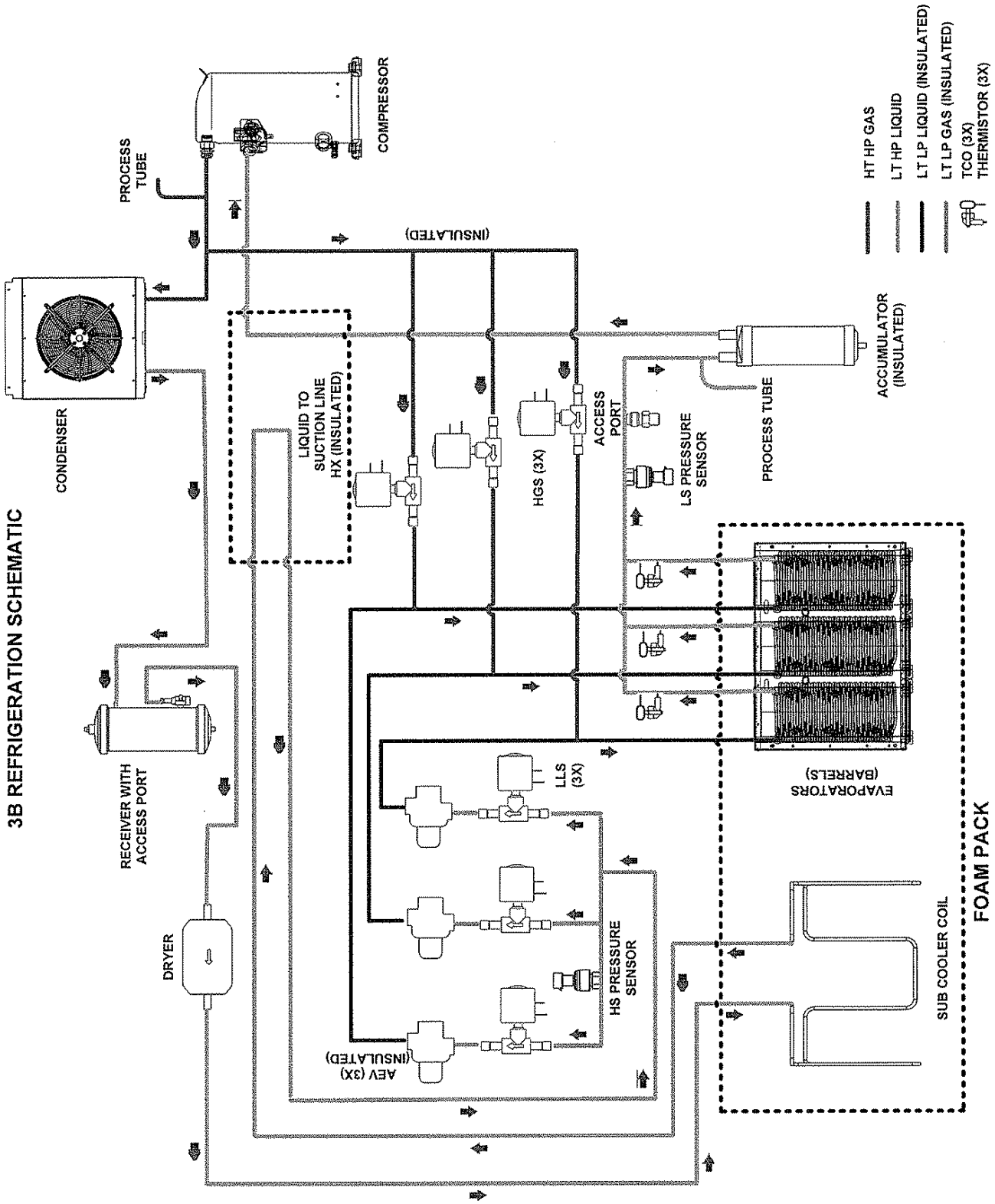

Figure 2. Viper System 3-Barrel Refrigeration Schematic

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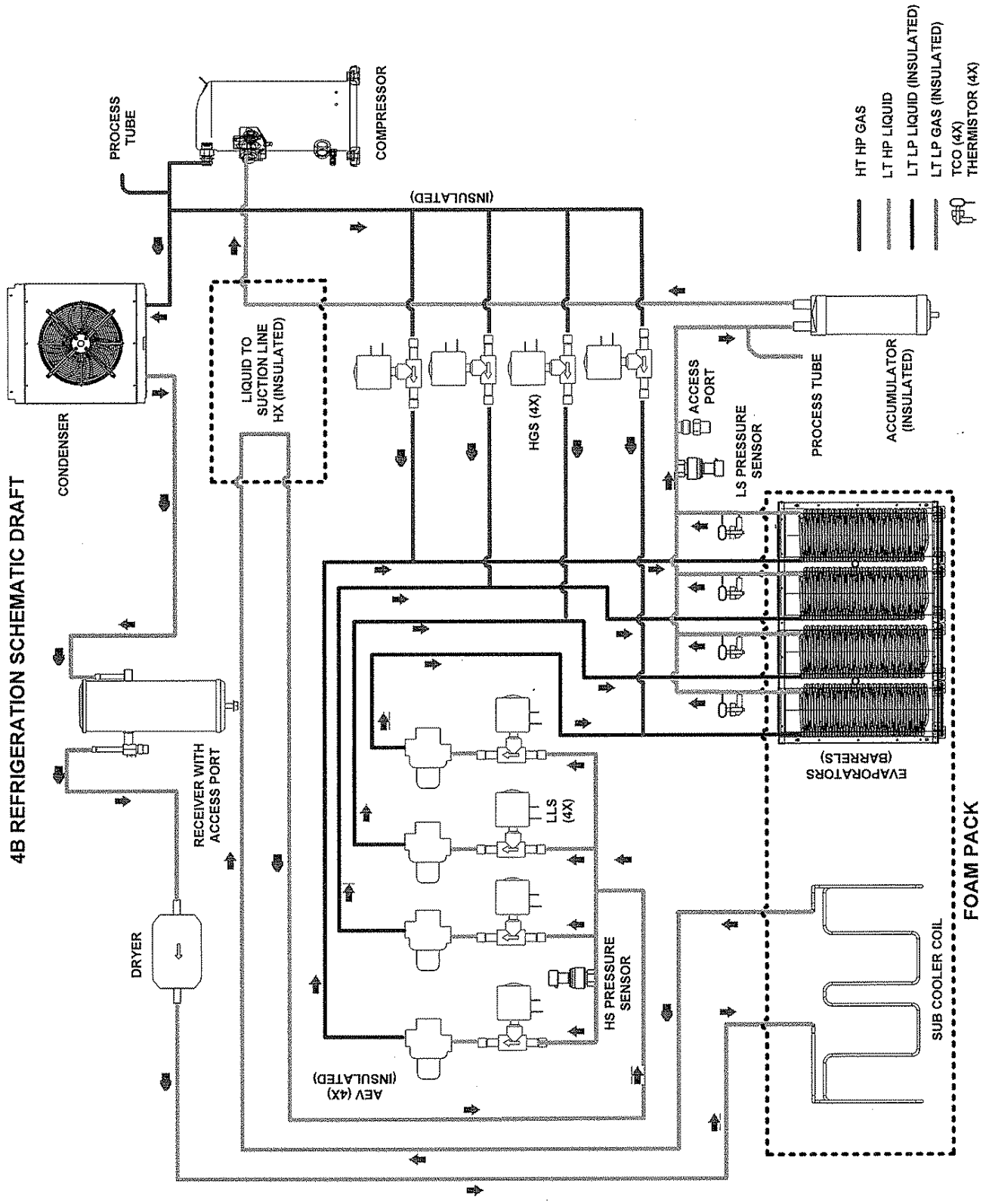

Figure 3. Viper System 4-Barrel Refrigeration Schematic

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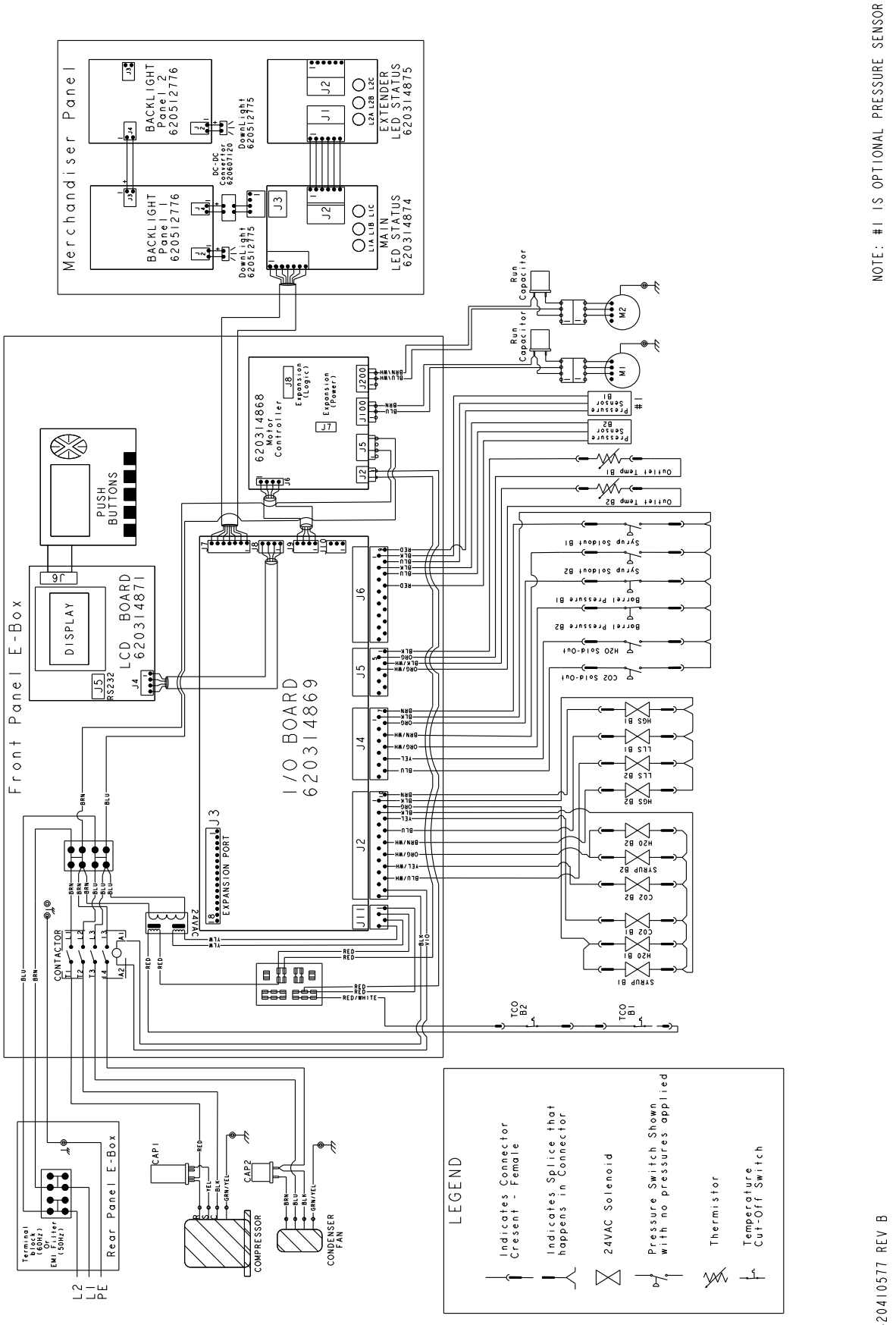

Figure 4. Viper 2-Barrel Wiring Diagram

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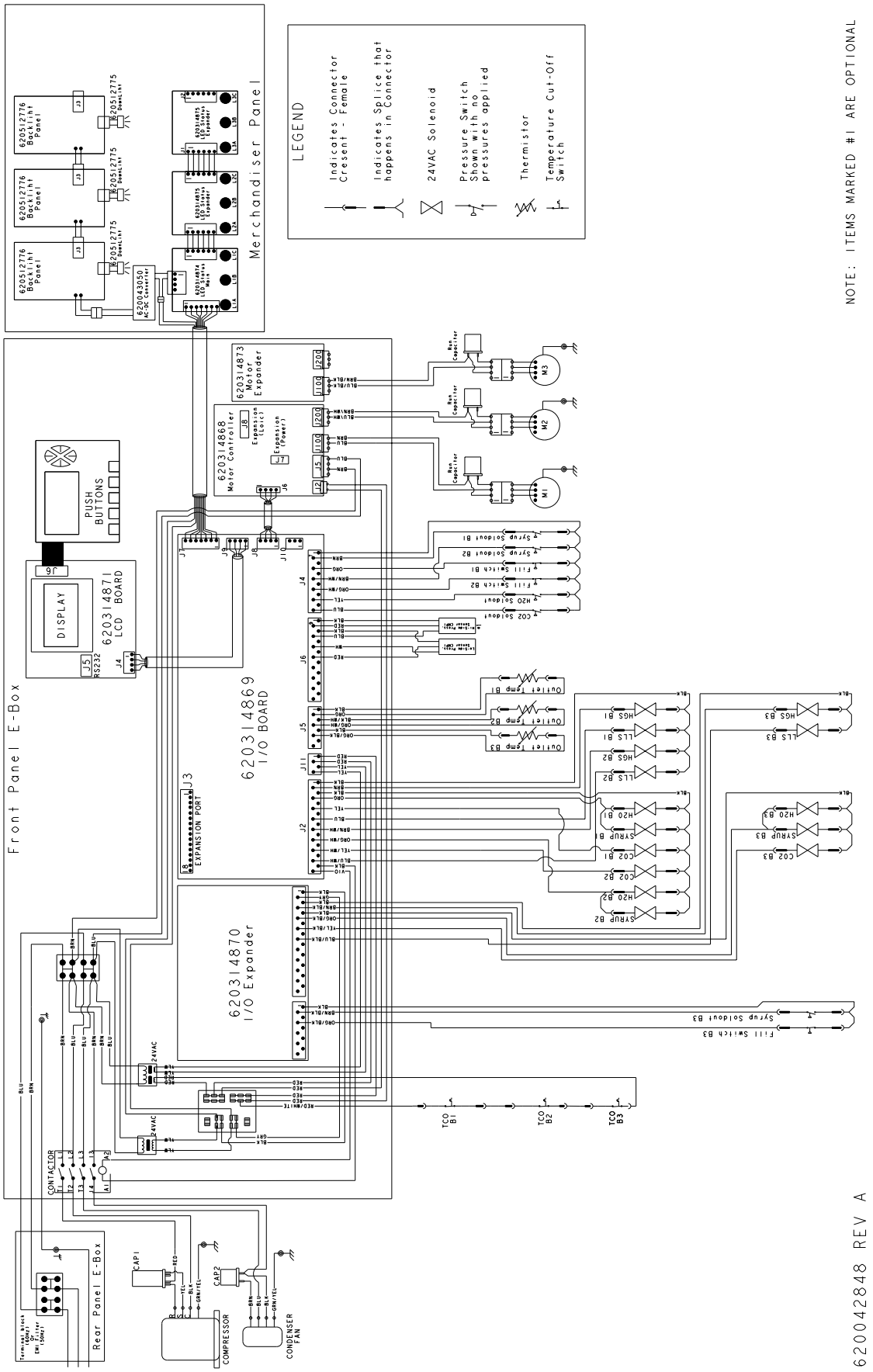

Figure 5. Viper 3-Barrel Wiring Diagram

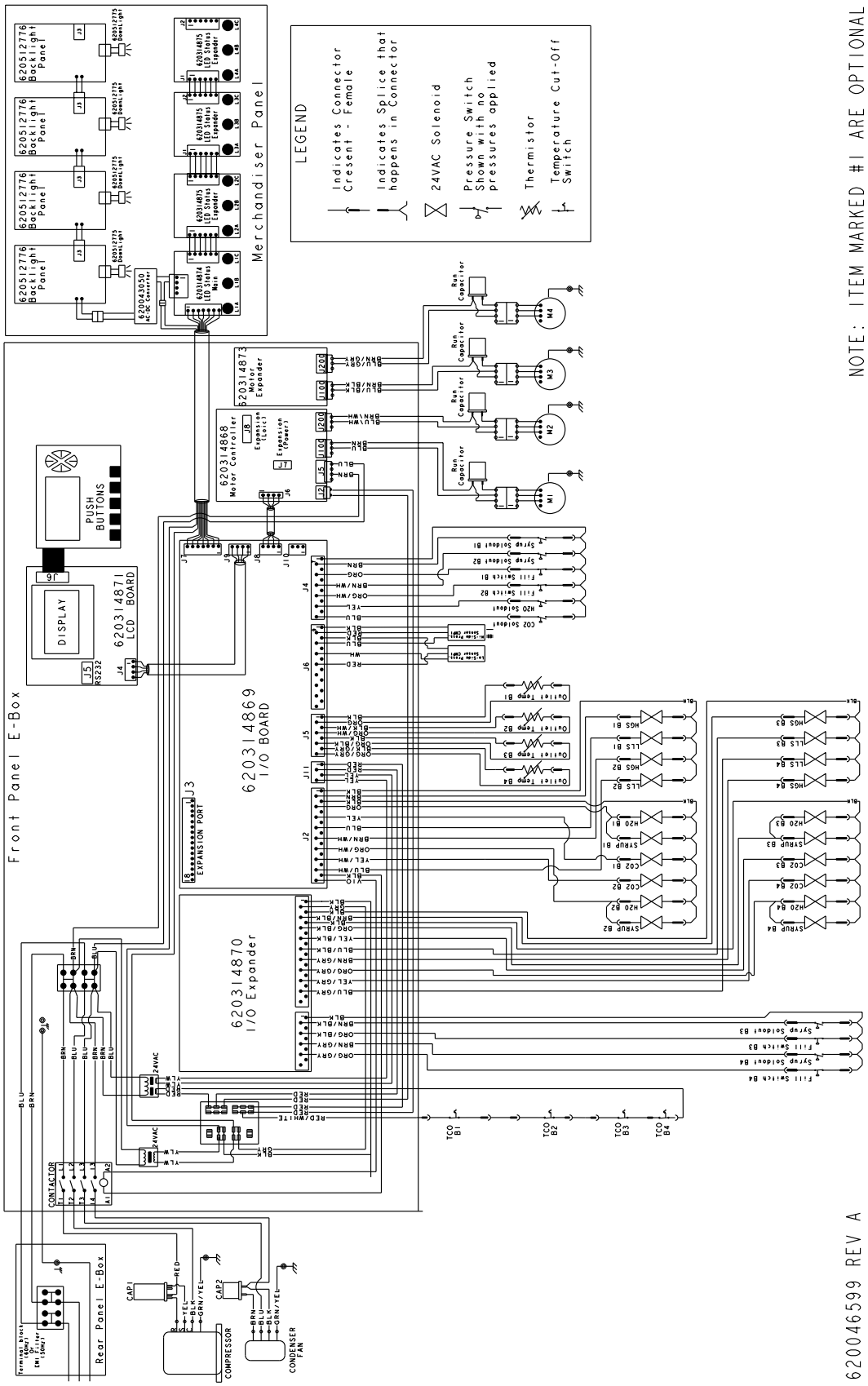

Figure 6. Viper 4-Barrel Wiring Diagram

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An overall schematic of the three delivery systems contained in the unit are shown in Figure 9, Figure 10 and Figure 11. The CO_2 system is on top, the water system is in the middle and the syrup system is at the bottom of the diagram. The CO_2 system interacts with both the water and syrup systems. It provides pressure and carbonation for the syrup/water product mix.

CO_2 System

A CO_2 tank or bulk CO_2 supply delivers carbon dioxide gas (CO_2) to an adjustable secondary CO_2 regulator assembly that is attached to the tank as shown in Figure 7 and Figure 8. The CO_2 system also supplies CO_2 to the water boost pump, the expansion tank regulator and the secondary CO_2 tank regulators.

CO_2 enters the expansion tank regulator and is reduced to approximately 30 psig to feed holding pressure on the expansion tank. This provides a force to work against the barrel pressure when the product freezes and expands.

CO_2 also enters the secondary regulators. These regulators are used to adjust barrel overrun/expansion for various products. The pressure settings for various types of syrup are shown in Table 1. Overrun CO_2 pressure is applied to the CO_2 control solenoids through preset orifices and on to the in-line check valves.

From the in-line check valve, the CO_2 flows into the product line.

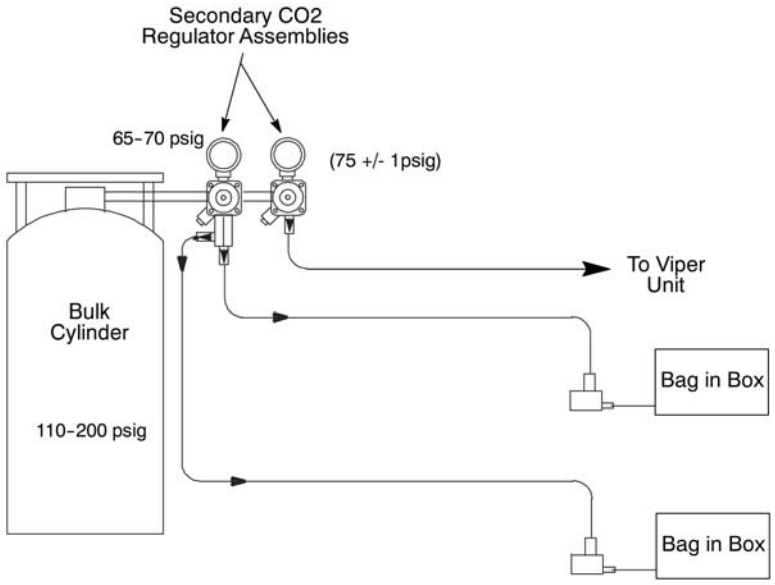

Figure 7. Typical Bulk Cylinder CO_2 Connection

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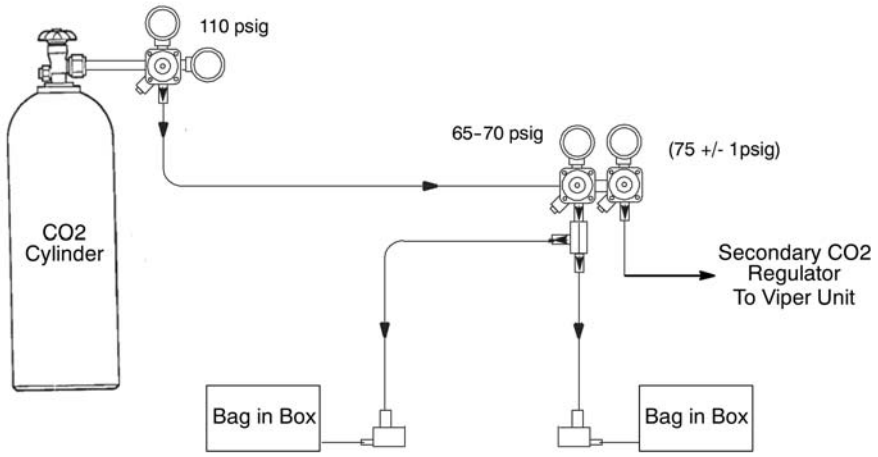

Figure 8. Typical Tank CO_2 Connection

Table 1 provides guidelines for machine settings based on general syrup type. Several factors, including syrup formulation, level of citric acids, etc, will impact settings. These settings are to provide initial adjustments to achieve product overruns in the 80-120% range.

Table 1

Syrup Type	Syrup Type Set	Viscosity	Pressure	Expansion
FCB Syrup w/ Foaming Agent	FCB	4	34-36 PSIG	30
FCB Syrup w/o Foaming Agent	FCB	4	32-36 PSIG	30
FUB	FUB	7	N/A	30

NOTE: For citric syrups, adjust the CO_2 pressures down by 2-4 PSIG from the above to compensate for the lower CO_2 adsorption.

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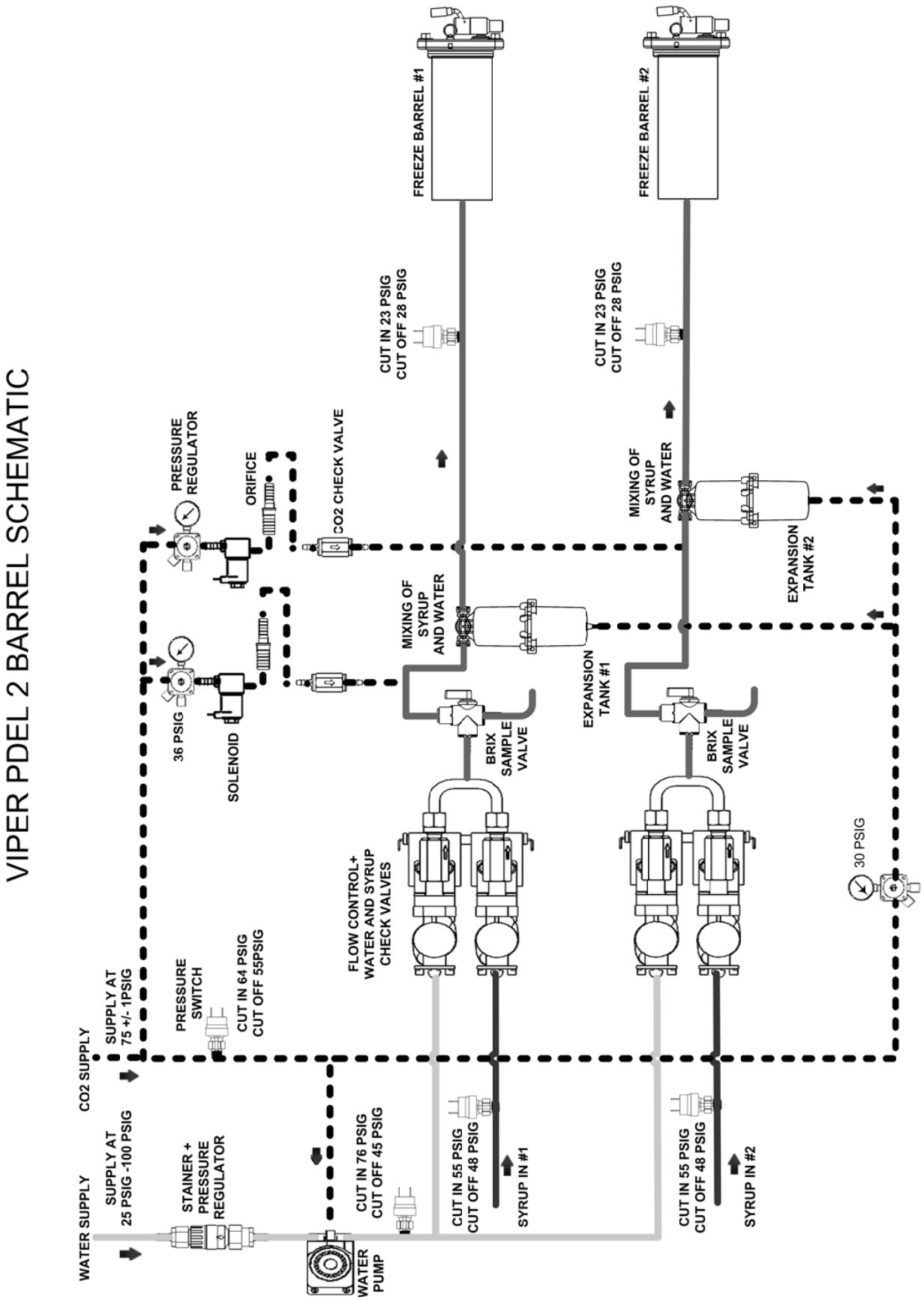

Figure 9. 2-Barrel System Schematic

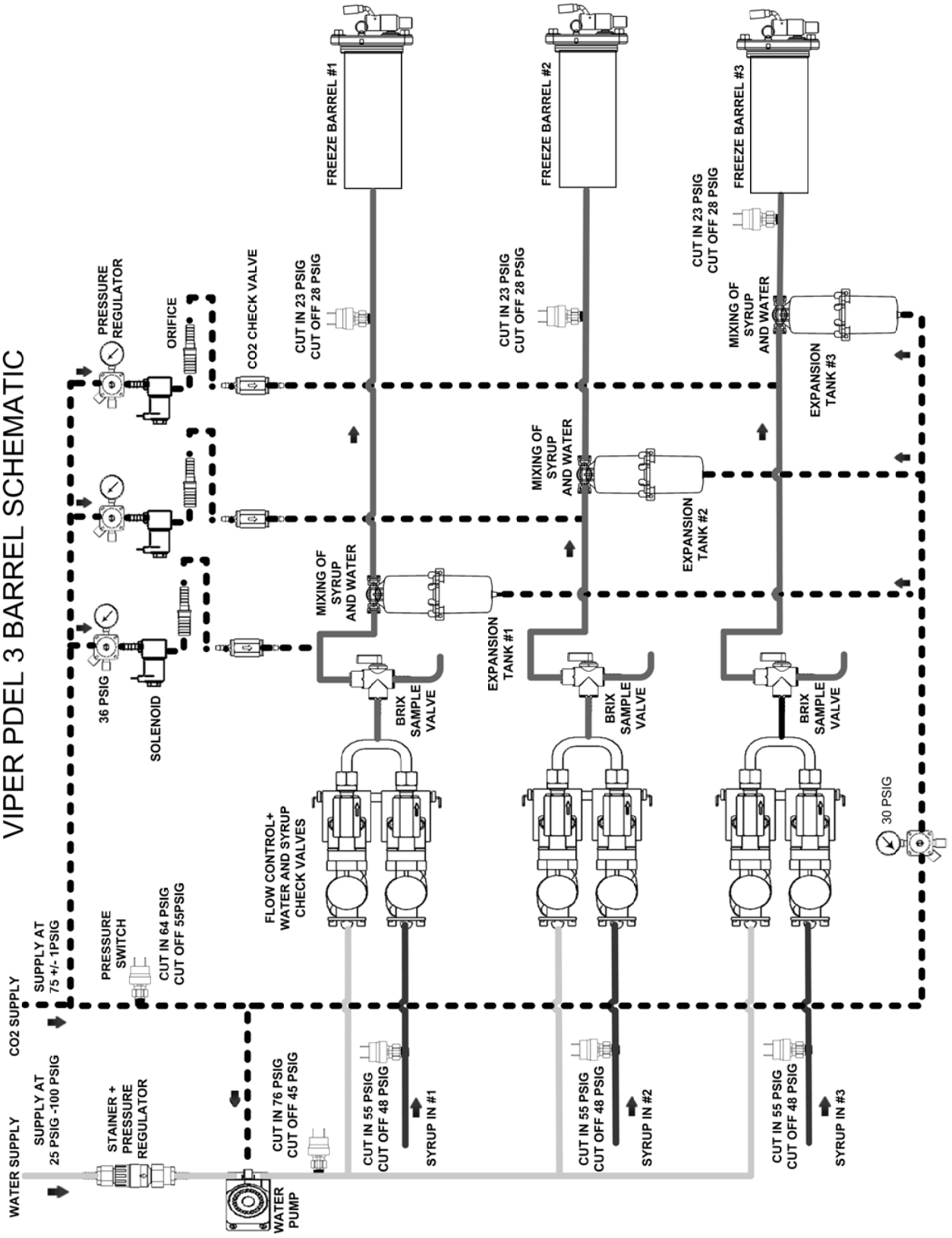
VIPER PDEL 3 BARREL SCHEMATIC
WATER SUPPLY
SUPPLY AT 25 PSIG -100 PSIG
STAINER + PRESSURE REGULATOR
CO2 SUPPLY
SUPPLY AT 75 +/- 1PSIG
PRESSURE SWITCH
CUT IN 64 PSIG CUT OFF 55PSIG
CUT IN 76 PSIG CUT OFF 45 PSIG
WATER PUMP
FLOW CONTROL+ WATER AND SYRUP CHECK VALVES
CUT IN 55 PSIG CUT OFF 48 PSIG
SYRUP IN #1
CUT IN 55 PSIG CUT OFF 48 PSIG
SYRUP IN #2
CUT IN 55 PSIG CUT OFF 48 PSIG
SYRUP IN #3
BRIX SAMPLE VALVE
BRIX SAMPLE VALVE
BRIX SAMPLE VALVE
MIXING OF SYRUP AND WATER
EXPANSION TANK #1
MIXING OF SYRUP AND WATER
EXPANSION TANK #2
MIXING OF SYRUP AND WATER
EXPANSION TANK #3
30 PSIG
36 PSIG
SOLENOID
PRESSURE REGULATOR
ORIFICE
CO2 CHECK VALVE
CUT IN 23 PSIG CUT OFF 28 PSIG
CUT IN 23 PSIG CUT OFF 28 PSIG
CUT IN 23 PSIG CUT OFF 28 PSIG
FREEZE BARREL #1
FREEZE BARREL #2
FREEZE BARREL #3

Figure 10. 3-Barrel System Schematic

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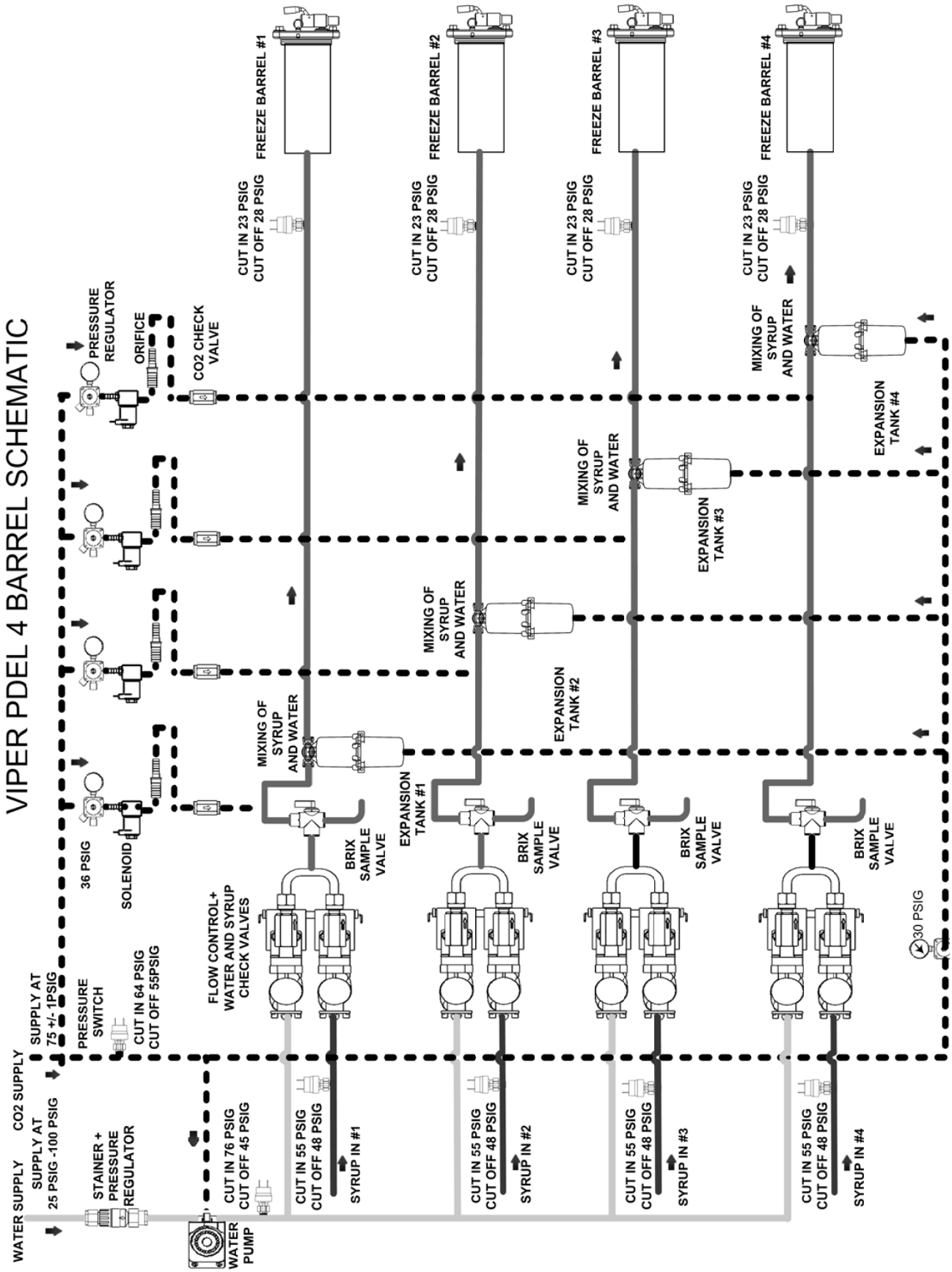

Figure 11. 4-Barrel System Schematic

Water System

Incoming water flows to a water pressure regulator that is preset to 30 psig. It flows through the water booster pump, to the regulator and through a sold-out switch.

Once through the boost pump, the water supply is split to each barrel and is fed to the water flow controls. From the flow rate control, the water passes through a single ball check valve and mixes with the syrup in a wye fitting for injection into the freeze barrel.

Syrup System

Syrup enters the unit through a sold-out switch. It enters a similar flow control to the water system, passes through a single-ball check valve and into the wye fitting where it meets the water for injection into the freeze barrel.

CONTROL PANEL

Introduction

The Viper unit uses a microprocessor based control system that monitors and controls all of the major systems and components of the machine. Temperatures and pressures are monitored, along with pumps, valves and the refrigeration system. They are managed by the control system to provide a consistently high quality product with optimal efficiency.

The control system is set up by the service provider to perform the tasks necessary to keep the Viper unit operating correctly. In addition to controlling the unit, the control system keeps track of the diagnostic information used when adjusting and/or repairing the machine.

The control system needs to be accessed in the following situations:

- Installing the Viper
- Modifying Operating Characteristics
- Checking Performance
- Servicing/Repairing the Machine
- Checking for Error Messages

The control system is accessed using the control panel located behind the lighted merchandiser. The control panel contains an LCD display and buttons shown in Figure 12.

There are 2 levels of access to the control panel: The first level can be accessed by the operator for normal operation and the second level is used by qualified

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service technicians for installation and service functions. The service functions can be secured (locked out) so that an operator does not have access to them. The control panel has a structured organization of menus. The outline of this structure is shown in Figure 13. The Maintenance sub-menu is not visible when the security feature is on.

The first menu that is displayed after the unit is powered up and stabilized is the BARREL STATUS or HOME menu, shown in Figure 12. This menu is displayed when the unit is running in normal operation.

Control Panel Display

The control panel display has two main areas. The first area is the menu display area. This area presents information about the status and settings of the machine. It also displays menus of actions that are taken to modify the functioning of the machine.

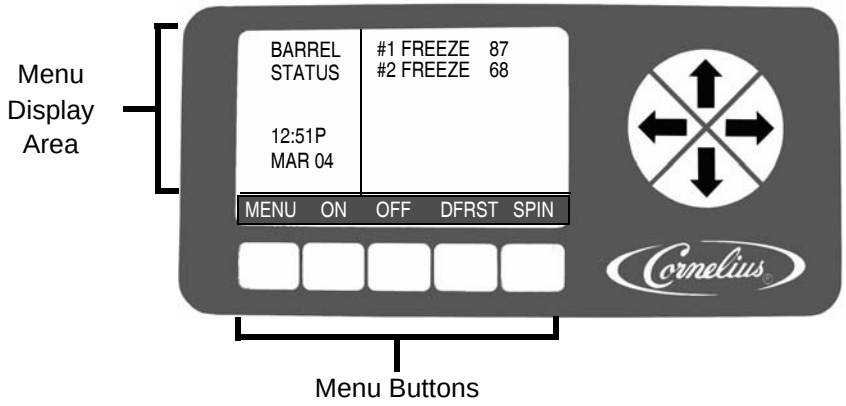

Figure 12. Control System Display

Control Panel Buttons

The second area are the buttons and arrows located across the bottom and on the right side of the control panel. There are up to five buttons and four directional arrows that may be used on a screen to activate and control various the functions of the system. Each button that is active for a given menu has a label directly above it. The label describes what that button controls. For example, from the Barrel Status menu, pressing button 1 (labeled MENU) displays the Select menu with more options — pressing button 3 (labeled OFF) turns off the highlighted barrel.

On each menu below the Select menu, there is a button (labeled BACK) to save any settings and return to the previous menu. There is another button (GO) to advance to the highlighted menu.

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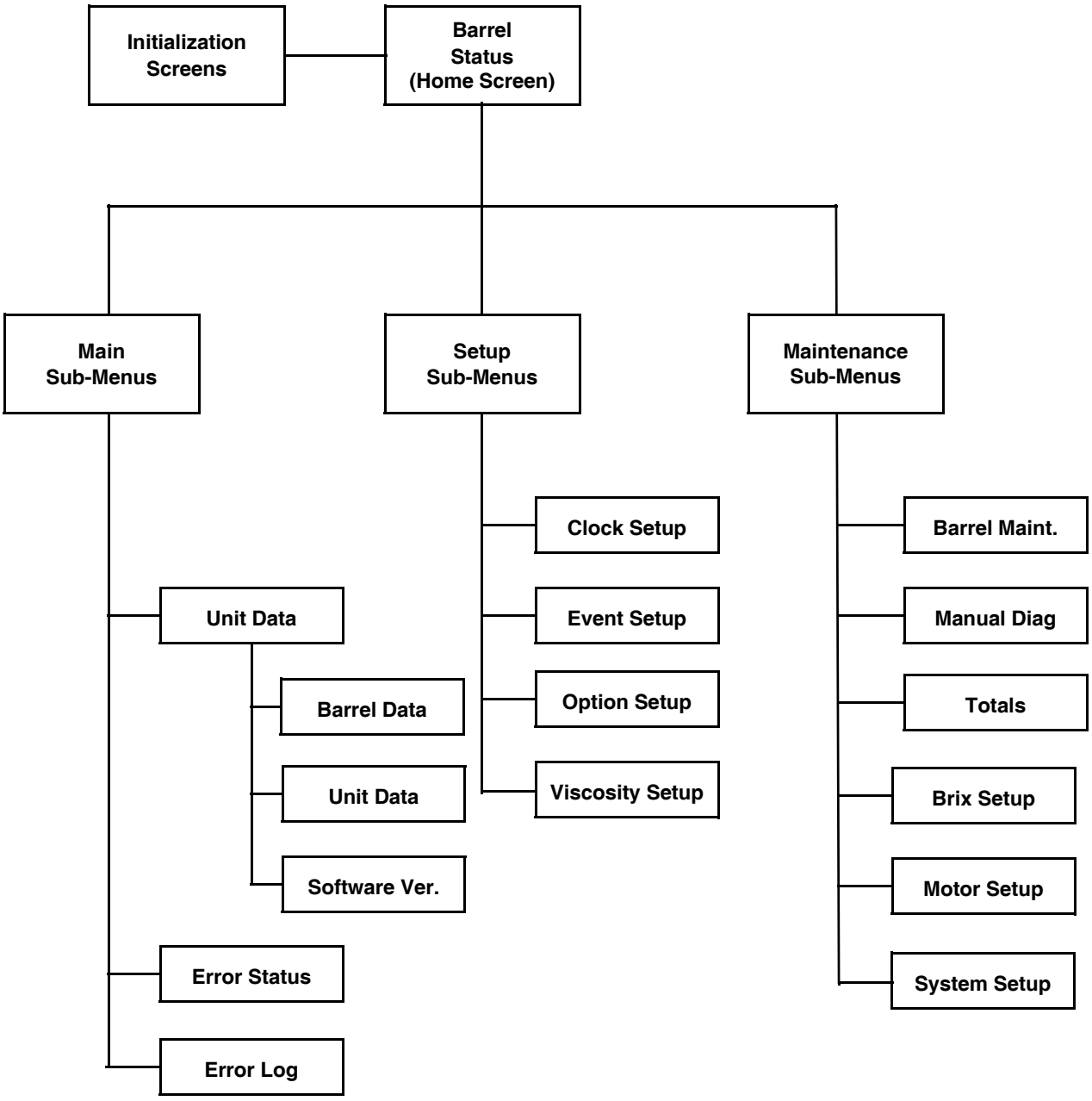

Figure 13. Software Structure

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CONTROL PANEL MENU DESCRIPTIONS

The following section describes the information displayed on each control panel menu and the interactions and settings that are controlled by that menu.

System Menus

The system menu structure allows the user to control the unit through the control panel. Operational settings, optional parameters, troubleshooting and error information are controlled through this menu system.

The Barrel Status menu, shown in Figure 14, is the home screen for the unit. During normal operation, this screen is displayed on the control panel.

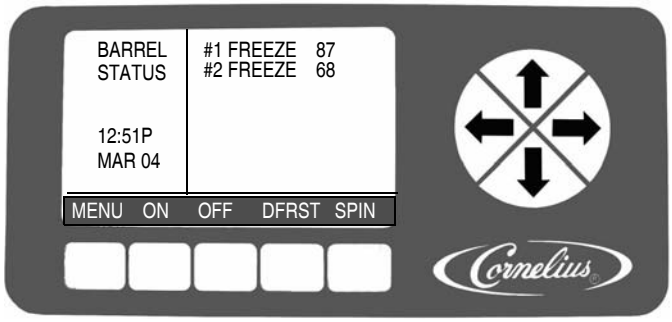

Figure 14. Main Screen

Table 2

Button	Description
MENU	Displays the Main menu
ON	Turns on the highlighted barrel
OFF	Turns off the highlighted barrel
DFRST	Initiates a manual defrost on the highlighted barrel. Manual defrost is limited to a four minute cycle.
SPIN	Turns off refrigeration, if on and mixes the product in the barrel.

Main Menu

To access the menus for the system from the Barrel Status menu, press the MENU button. This displays the Select menu, shown in Figure 15. The Setup and Maintenance menus are accessed through the buttons shown at the bottom of the display.

NOTE: If security is turned on, the MAINT button is not displayed.

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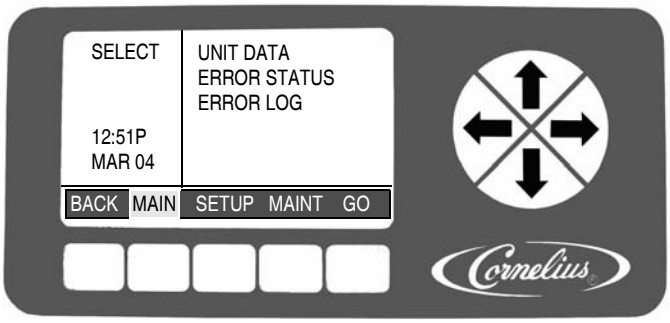

Figure 15. Select Screen

When the Select menu is displayed, the Unit Data is highlighted. To access the Unit Data menu, press the GO button. Refer to Table 3, the Select menu, for button functions.

Table 3

Button	Description
BACK	Returns the display to the Barrel Status menu
MAIN	Highlighted to indicate current menu
SETUP	Opens the Setup menu
MAINT	Displays and opens Maintenance menu, *if security is off or accessed*
GO	Opens the highlighted selection on the current menu

Unit Data Menu

The Unit Data screen, shown in Figure 16, provides information about the individual barrels in the system. When DATA is highlighted and the GO button is pressed on the Select menu, the display shows the first barrel in the system and some of its parameters. To view the next barrel, press the Down arrow on the right side of the display. Continue pressing the Down arrow to view the data on all barrels in the system. Refer to Table 4 for button functions.

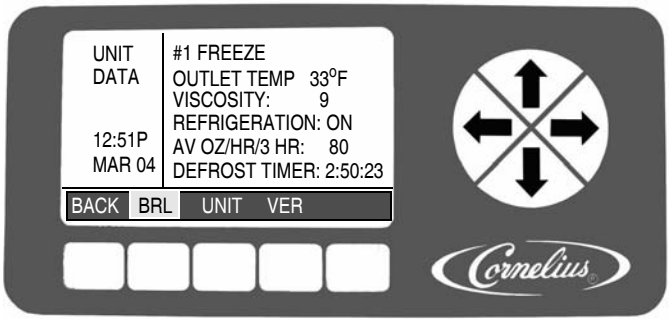

Figure 16. Unit Data Screen

Table 4

Button	Description
BACK	Returns the display to the Select menu
BRL	Displays the data for a single barrel, including Outlet Temperature, Viscosity, if Refrigeration is On or Off, Average Ounces of product dispensed per hour for the last three hours and Defrost Lock Time until next defrost

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Table 4

Button	Description
UNIT	Displays the real time input voltage and frequency being supplied to the unit and the low, high or both refrigeration pressures for the unit, depending on the settings of the compressor sensors in the Unit Data screen, as shown in Figure 36.
VER	Displays the version number of the UI, I/O, Motor and Status boards installed in the unit

Error Status Menu

The Error Status menu, shown in Figure 17, displays any current errors contained in the Error Messages List.

There are three types of errors that can be generated by the system. These error types and a description of their meaning are listed in Table 5.

Table 5

Error Type	Description
System	A System error displays the same information across all barrels in the unit.
Barrel	A Barrel error is limited to a specific barrel
Limp	A Limp error is an error that doesn't prevent the unit from operating, but limits functionality.

The possible messages from the control system and a description of the errors are shown in Table 6. The button functions are described in Table 7.

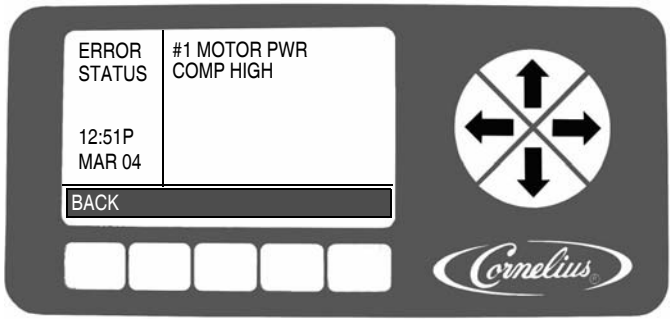

Figure 17. Error Status Screen

Table 6

Displayed Message	Action	Type	Description
HOT GAS	Off	System	Occurs when the barrel outlet temperature exceeds 115 ^{O}F for more than one minute and the compressor is on.
HOT BARREL	Off	System	Occurs when the barrel outlet temperature exceeds 115 ^{O}F for more than one minute and the compressor is off.
MTR CTL FAIL		System	The motor controller reported a fault, triacs are shorted and there is a loss of motor on/off functionality.
TCO OPEN		System	TCO (Temperature Cut Off) has occurred on the refrigeration oulet of a barrel or the 24VAC power has failed.

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Table 6

Displayed Message	Action	Type	Description
COMM ERR IO		System	A communications error occurred between the IO board and the UI board.
COMM ERR MTR		System	UI board cannot communitcate with the motor board.
BARREL REFRG		Barrel	Compressor has been on for more than 45 minutes and the viscosity of the barrel is not satisfied with no draws.
MTR CAL ERR		Barrel	Occurs if a calibration initiated from the Motor Setup menu fails. This indicates that the power draw of the motor is outside the allowable calibration range.
CMP HI-PRESS		System	This error is generated if the low side pressure is greater than 55 psi for greater than 30 sec. Only checked when barrels are in freeze mode and compressor is running more than two minutes.
BRL TEMP OUT		Barrel	Indicates thermistor reading is at min. or max. value for 30 sec. without changing.
MOTOR STALL		Barrel	Motor stalled. A two minute defrost and two retries are allowed, then the message is displayed,
METER FAIL		Barrel	Metering chip is nonresponsive.
BRL RECOVER		Barrel	Barrel viscosity is too high. Motor cannot rotate. Automatic two minute defrost to thaw barrel.
COM ERR STAT		Limp	Communications error, the system continues to run.
HIGH VOLTAGE		System	The unit is experiencing voltage greater than 260VAC. System is enabled when line voltage drops below 260VAC for two minutes.
LOW VOLTAGE		System	The unit is experiencing voltage less than 200VAC. System is enabled when line voltage rises above 200VAC for two minutes.
NO MOTOR		Barrel	The motor is reporting no current draw when activated. Motor is unplugged or thermal cutoff has tripped.
FILL ERROR		Barrel	Barrel has not filled properly within 2 min.
H_2O OUT		System	Water pressure is too low for proper operation. This error occurs when the H_2O sensor reports no or low water pressure for more than one second. Error is cleared 10 sec. after restoral.
CO_2 OUT		System	CO_2 pressure is below required operating pressure. This error occurs when the CO_2 sensor reports no or low CO_2 pressure for more than one second. Error is cleared 10 sec. after restoral.
SYRUP OUT		Barrel	Syrup pressure is below required operating pressure. This error occurs when the syrup sensor reports no or low syrup pressure for more than one second. Error is cleared 10 sec. after restoral.
CLOCK		System	The real time system clock is not functioning.
MTR CTL EEPROM		System	Motor control EEPROM is bad or missing.

Table 7

Button	Description
BACK	Returns the display to the Select menu
RESET	Allows the user to reset the highlighted error (This button only appears on certain manually resettable errors.)

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Error Log Menu

The Error Log screen displays information about any errors generated by the unit, as shown in Figure 18. If no errors have been detected, the right side of the display is blank. To view more than one error, press the Up or Down arrows on the right side of the display to scroll through the error log. Button functions are described in Table 8.

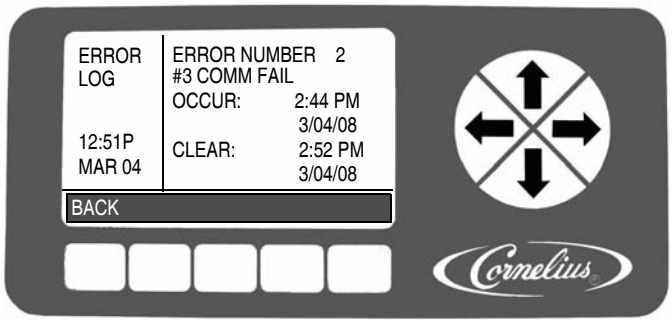

Figure 18. Error Log Screen

Table 8

Button	Description
BACK	Returns the display to the Select menu

Setup Menu

The Setup menu provides the means to change various settings to local preferences, such as time, date and temperature formats. It also allows the user to adjust the unit for the type of syrup being served in each barrel.

To access the Setup menu from the Barrel Status menu, press the MENU button. This displays the Select menu, shown in Figure 15. Press the SETUP button to display the Setup menu, shown in Figure 19. To set up the unit options, use the Up and Down arrows on the right side of the control panel to highlight the choices on the display. When the desired option is highlighted, press the GO button to access that menu.

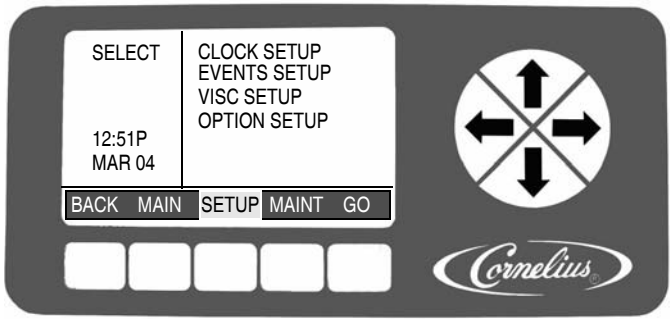

Figure 19. Setup Screen

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Table 9

Button	Description
BACK	Returns the display to the Select menu
MAIN	Opens the Main menu
SETUP	Highlighted to indicate that the Setup menu is displayed
MAINT	Displays button and opens Maintenance menu, if security is off or accessed
GO	Opens the highlighted selection on the current menu

Clock Setup Menu

Select the CLOCK SETUP menu from the Select menu, shown in Figure 19. This displays the Clock Setup menu, shown in Figure 20. Button functions are described in Table 10.

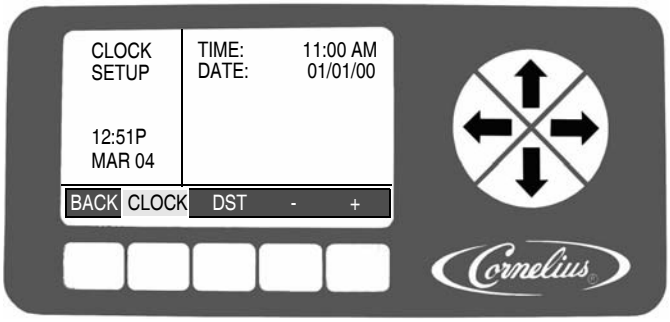

Figure 20. Clock Setup Screen

Table 10

Button	Description
BACK	Returns the display to the Select menu
CLOCK	Highlighted to indicate that the Clock menu is displayed
DST	Opens the Daylight Savings Time menu
-	Decrements the highlighted field
+	Increments the highlighted field

Setting the Clock

Select the CLOCK SETUP menu from the Select menu, shown in Figure 19. This displays the Clock Setup menu, shown in Figure 20. To set the time, perform the procedure in Table 11.

Table 11

Step	Action	Procedure
1	Set clock time	Use up and down arrows on the right side of the control panel to highlight TIME display on screen.
2	Select hour field	Use the left and right arrows to select hour field

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Table 11

Step	Action	Procedure
3	Set correct hour	Use the + or - buttons at the bottom of the display to set the proper hour.
4	Select minute field	Use the left and right arrows to select minute field.
5	Set correct minute	Use the + or - buttons at the bottom of the display to set the proper minute.
6	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field.
7	Set AM/PM	Use the + button at the bottom of the display to set the AM/PM setting.

To set the date, perform the procedure in Table 12 and refer to Figure 20.

Table 12

Step	Action	Procedure
1	Set date	Use up and down arrows on the right side of the control panel to highlight DATE display on screen.
2	Select month field	Use the left and right arrows to select month field
3	Set correct month	Use the + or - buttons at the bottom of the display to set the correct month.
4	Select day field	Use the left and right arrows to select day field.
5	Set correct day	Use the + or - buttons at the bottom of the display to set the correct day.
6	Select year field	Use the left and right arrows to select year field.
7	Set correct year	Use the + or - buttons at the bottom of the display to set the correct year.

Setting Daylight Savings Time

Once the date and time are set properly, daylight savings time settings can be done. The Daylight Savings Time menu is shown in Figure 21. If daylight savings time is off, press the + button to activate it. The button functions are described in Table 13. To set daylight savings time, perform the procedure in Table 14.

NOTE: Default daylight savings settings are for the U.S.

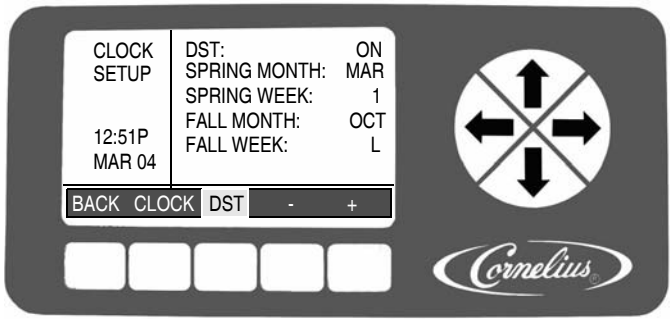

Figure 21. Daylight Savings Setup Screen

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Table 13

Button	Description
BACK	Returns the display to the Select menu
CLOCK	Opens the Clock menu
DST	Highlighted to indicate DST menu
-	Decrements the highlighted field by one increment
+	Increments the highlighted field by one increment

Table 14

Step	Action	Procedure
1	Set daylight savings time	Press DST button at the bottom of display to open daylight savings time display, shown in Figure 21.
2	Select DST	Use the up and down arrows to select DST.
3	Set DST on	Use the + button to turn on daylight savings time.
4	Select SPRING MONTH	Use up and down arrows to select SPRING MONTH.
5	Set SPRING MONTH	Use the + or - buttons at the bottom of the display to set the correct month.
6	Select SPRING WEEK	Use up and down arrows to select SPRING WEEK.
7	Set SPRING WEEK	Use the + or - buttons at the bottom of the display to set the correct week. The choices are 1, 2, 3 or L.
8	Select FALL MONTH	Use the up and down arrows to select FALL MONTH.
9	Set FALL MONTH	Use the + or - buttons at the bottom of the display to set the correct month.
10	Select FALL WEEK	Use up and down arrows to select FALL WEEK.
11	Set FALL WEEK	Use the + or - buttons at the bottom of the display to set the correct week. The choices are 1, 2, 3 or L.

When the daylight savings settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 19.

Events Setup Menu

The Events Setup menu, shown in Figure 22, allows the user to set sleep periods for the unit and to lock out the defrost cycle during peak busy times. Sleep periods and defrost lockouts may be programmed for any day of the week or for all days of the week, depending on business requirements. Button functions are described in Table 15.

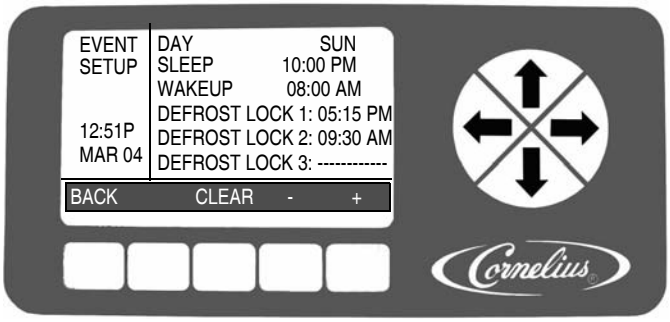

Figure 22. Event Setup Screen

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Table 15

Button	Description
BACK	Returns the display to the Select menu and saves current settings
CLEAR	Clears the highlighted field on the menu
-	Decrements the highlighted field
+	Increments the highlighted field

When the sleep and wakeup settings and the defrost lockout settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 19.

Setting Events

Events setup allows the user to set sleep periods for the unit and to lock out the defrost cycle during peak busy times. Sleep periods and defrost lockouts may be programmed for individual days of the week or for all days of the week, depending on location requirements.

Setting the Sleep and Wakeup Times

Sleep and wakeup times are set on the Event Setup menu shown in Figure 22. To set the sleep and wakeup times, perform the procedure in Table 16.

When the unit goes into a sleep period, the barrel automatically defrosts for four minutes. Also, if a barrel is off when the sleep cycle starts, the barrel continues to be in the off state when the sleep cycle ends. If a barrel is running when the sleep cycle starts, the barrel starts back up when the sleep cycle ends.

Wakeup should be scheduled for approximately one hour before product is required.

NOTE: Setting the sleep time after midnight requires you to set it during the next day. (i.e. Saturday night at 1am must be set as 1am on Sunday, etc.) If this type of setting is required, you cannot set another sleep cycle during that following day, i.e. Sunday.

Table 16

Step	Action	Procedure
1	Set sleep and wakeup times	Open the Events Setup menu, shown in Figure 22 by pressing the GO button.
2	Select DAY	The DAY field is highlighted.
3	Set DAY	Use the + or - buttons at the bottom of the display to set the desired day or all days.
4	Select SLEEP	Use the up and down arrows to highlight SLEEP.
5	Set hour field	Use the left and right arrows to select the hour field and press the + or - buttons to change the hour.
6	Set minute field	Use the left and right arrows to select the minute field and press the + or - buttons to change the minutes (15 min. increments)

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Table 16

Step	Action	Procedure
7	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field. Then press the + or - buttons to change between AM and PM.
8	Select DAY for Wakeup	Repeat Steps 2 and 3 as needed.
9	Select WAKEUP	Use the up and down arrows to highlight WAKEUP and repeat Steps 5 through 7 to set the WAKEUP times.

When the sleep and wakeup settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 19.

Setting Defrost Lockout

From the Barrel Status menu, shown in Figure 14, press the MENU button and then press the SETUP button to display the Setup menu. Use the up and down arrows on the right of the control to highlight the Events Setup menu, then press GO to enter the menu (Figure 22).

The lockout can also be set day by day or for all days with up to three lockout periods of three hours each per day. These lockout periods may be overlapped to provide from three to nine hours of defrost lockout, if desired. When the periods are overlapped, it is recommended that the defrost lockouts for sequential lockout periods be overlapped by 15 minutes. The defrost lockout affects all barrels in the unit. To set the defrost lockouts, perform the procedure in Table 17.

Table 17

Step	Action	Procedure
1	Set defrost lockout	Open Events Setup menu, shown in Figure 22
2	Select DAY	The DAY field is highlighted.
3	Set DAY	Use the + and - buttons at the bottom of the display to set the desired day or all days.
4	Select DEFROST LOCK 1	Use the up and down arrows to highlight DEFROST LOCK 1.
5	Set hour field	Use left and right arrows to select hour field
6		Use the + and - buttons at the bottom of the display to set the desired hour.
7	Set minute field	Use left and right arrows to select minute field
8		Use the + and - buttons at the bottom of the display to set the desired minute (in 15 min. increments).
9	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field.
10		Use the + button at the bottom of the display to set the AM/PM field.
11	Select DEFROST LOCK 2	Repeat Steps 2 through 10 for the DEFROST LOCK 2 time, if desired.
12	Select DEFROST LOCK 3	Repeat Steps 2 through 10 for the DEFROST LOCK 3 time, if desired.

When the defrost lockout settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 19.

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Viscosity Setup Menu

The viscosity maintained in the freeze barrels depends on the type of product being served. Some products are served best at a higher viscosity, while others require a lower viscosity for best quality. The Viscosity menu, shown in Figure 23, allows the user to adjust the viscosity in each barrel to the optimum setting for each type of syrup.

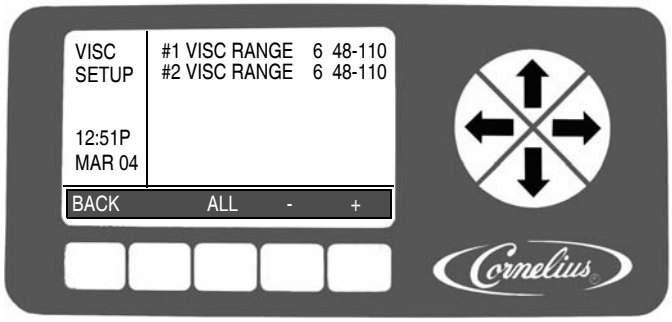

Figure 23. Viscosity Setup Screen

Refer to the Installation manual for the recommended settings based on syrup type.

Table 18

Step	Action	Procedure
1	Set viscosity range	From the Setup screen (Figure 19), open the Viscosity Setup screen, shown in Figure 23.
2	Select barrel	Use the Up and Down arrows to highlight the desired barrel.
3	Select range field	Use Left and Right arrows to select range field
4.	Set range	Use the + or - buttons at the bottom of the display to set the desired range.
5	Select barrel	Repeat Steps 2 through 4 for all barrels.

To set all barrels in the system to the same viscosity setting, perform Steps 1 through 4 in Table 18, and then press the ALL button at the bottom of the display while highlighting the viscosity setting you desire for all the barrels. When the viscosity settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 19.

Options Setup Menu

The Option Setup menu allows the user to set the various options available in the system. These options are listed in Table 19. The Option Setup menu is shown in Figure 24.

The functions of the display buttons change, depending on the highlighted selection on the Option Setup screen. Refer to Table 19 for a listing of the button functions for the various field selections.

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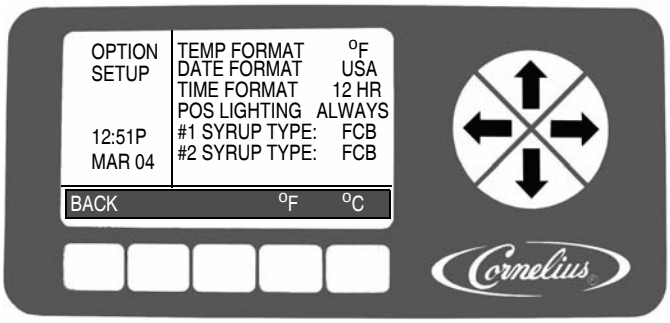

Figure 24. Option Setup Screen

Table 19

Option	Button 2	Button 3	Button 4	Button 5
Temp Format			°F	°C
Date Format			USA	EURO
Time Format			12 HR	24 HR
POS Lighting		OFF	ALWAYS	SLEEP
#1 SYRUP TYPE	FCB	FCB-L	FUB	FUB-L
#X SYRUP TYPE	FCB	FCB-L	FUB	FUB-L

When all the options are set to the desired settings for the unit, press the BACK button to store these settings and return to the Select menu, shown in Figure 19.

Setting the Temperature Format

The temperature format displayed by the unit may be set to either Centigrade or Farenheit. Press the °F button to display readings in Farenheit and press the °C button to display readings in Centigrade.

Setting the Date Format

The date format can be displayed in either United States or European format. To display U.S. date format, press the USA button. This displays the date in mm/dd/yy format. Press the EURO button to display the date in dd/mm/yy format.

Setting the Time Format

Time format can be displayed in either 12 or 24 hour format. To display the clock settings in 12 hour format (1:08 P), press the 12 HR button. To display settings in 24 hour format (23:05), press the 24 HR button.

Setting the POS Lighting

POS Lighting is controlled by the POS LIGHTING field on the Option Setup menu (Figure 24). To turn off the merchandiser lighting, press the OFF button

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while the POS LIGHTING field is highlighted. To turn on the merchandiser lighting permanently, press the ALWAYS button. To turn the merchandiser lighting on and off with the Sleep settings, press the SLEEP button.

Setting the Type of Syrup

Syrup type for each barrel may be selected by highlighting the desired barrel and pressing the appropriate button, FCB, FCB-L, FUB or FUB-L. FCB is for Frozen Carbonated Beverage, FCB-L is for Frozen Carbonated Beverages - Light (diet), FUB is for Frozen Uncarbonated Beverages and FUB-L is for Frozen Uncarbonated Beverages - Light (diet). Each of these settings provides the proper viscosity and temperature settings for the type of syrup being used.

Maintenance Menu

The Maintenance menu, shown in Figure 25, is only available to service personnel or other authorized users, if security is enabled.

The Maintenance menu is used for barrel maintenance, diagnostics, BRIX setup and system information. It allows the technician access to the unit during periodic maintenance or troubleshooting problems. It sometimes overrides the normal inputs from the system in order to perform this task.

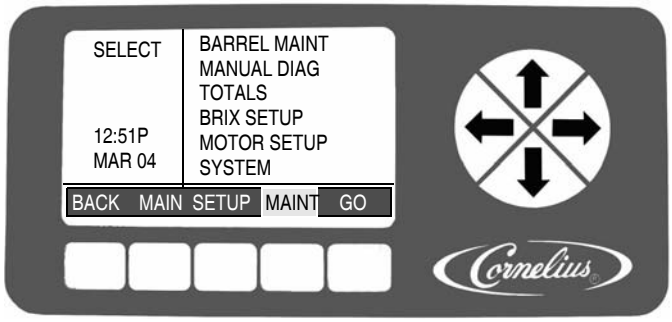

Figure 25. Select Screen

Barrel Maintenance Menu

The Barrel Maintenance menu, shown in Figure 26, allows the service technician to clean, rinse and sanitize the system on a barrel by barrel basis. The barrel must be OFF in order to perform the barrel maintenance functions. As a warning to the technician, the “Do Not Drink” status indicators are illuminated on the barrels when entering the Barrel Maintenance menu.

The procedure for purging a barrel is shown in Table 20. The procedure for filling a barrel is shown in Table 21. The procedure for running the scraper blade only on a barrel is shown in Table 22 and the procedure for waking up a barrel is shown in Table 24.

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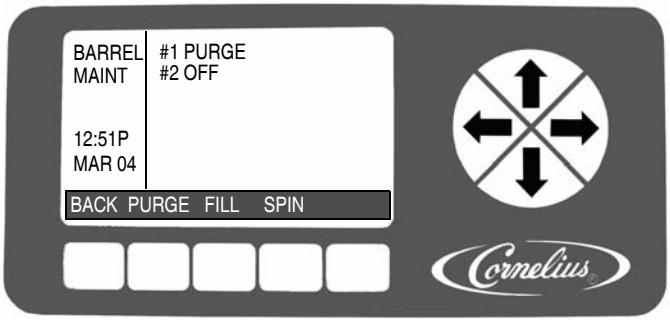

Figure 26. Barrel Maintenance Screen

Purging a Barrel

Table 20

Step	Action	Procedure
1	Purge a barrel	From the Select menu (Figure 25), open the Barrel Maintenance menu, shown in Figure 26.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Purge function	Press the PURGE button at the bottom of the display to select purge for the highlighted barrel
4	Empty the barrel	Place a container under the barrel dispensing valve, open the dispensing valve and dispense all the product from the barrel. As the product level lowers in the barrel, partially close the valve to avoid spurting.
5	Complete the procedure	When the barrel is completely empty, close the dispensing valve and press the STOP button at the bottom of the display to turn off the purge. Press the BACK button to return to the Select menu.

NOTE: When the PURGE button is pressed, it changes to a STOP button.

Filling a Barrel

Table 21

Step	Action	Procedure
1	Fill a barrel	From the Select menu (Figure 25), open the Barrel Maintenance menu, shown in Figure 26.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Fill function	Press the FILL button at the bottom of the display to fill the highlighted barrel
4	Finish filling the barrel	When the fill completes, intermittently open and close the relief valve to bleed CO_2 from the barrel.
5	Complete the procedure	Press the STOP button at the bottom of the display to stop the fill. Press the BACK button to return to the Select menu.

NOTE: When FILL button is pressed, it changes to a STOP button.

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Run the Barrel Motor

Table 22

Step	Action	Procedure
1	Run a barrel	From the Setup menu (Figure 25), open the Barrel Maintenance menu, shown in Figure 26.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Run function	Press the SPIN button at the bottom of the display to start the motor in the highlighted barrel
4	Stop the procedure	Press the STOP button at the bottom of the display to stop the motor. Press the BACK button to return to the Select menu.

NOTE: When RUN button is pressed, it changes to a STOP button.

Rinsing a Barrel

When rinsing a barrel, the Barrel Maintenance menu cannot be used. The procedure must be done manually, as described in Table 23.

Table 23

Step	Action	Procedure
1	Empty a barrel	If the barrel has liquid in it, use the Purge procedure in Table 20 to empty the barrel.
2	Rinse a barrel	Go to the Barrel Status menu (Figure 12).
3	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
4	Turn off the barrel	Press the OFF button at the bottom of the display to turn off the barrel.
5	Override Water Solenoid	Press the manual bypass on the water solenoid and fill the barrel with plain water. Use the relief valve on the faceplate of the barrel to relieve pressure and completely fill the barrel.
6	Run the barrel motor	Use the procedure in Table 22 to rinse the barrel.
7	Complete the procedure	Repeat the Purge procedure in Table 20 to empty the barrel.

Manual Diagnostic Menu

The Manual Diagnostic menu, shown in Figure 27, is used for troubleshooting and testing the system on a component basis. It allows the service technician to turn individual components of the system on and off for troubleshooting purposes. Pressing the BACK button returns the display to the Main menu and turns off all the active loads.

This screen should only be used by qualified technicians to troubleshoot the system.

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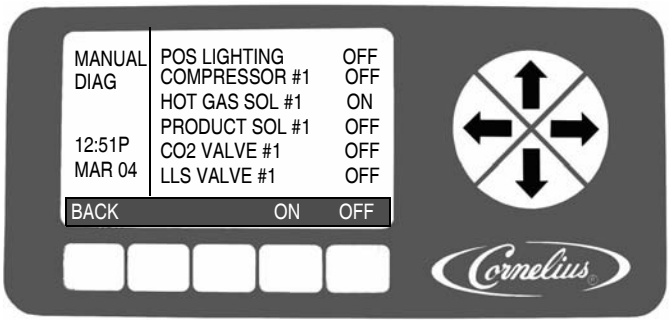

Figure 27. Manual Diagnostic Screen

The items shown in Table 24 are for the first barrel in the unit only. The list includes additional components with their related barrel number, i.e. Hot Gas Sol #2, etc.

CAUTION: The compressor can suffer damage if it is allowed to run without either a hot gas defrost or liquid line solenoid open. The software is designed to turn on the hot gas solenoid for a barrel to prevent damage from occurring.

Table 24

Display	Description
POS LIGHTING	This selection turns the Point-Of-Sale lighting on and off
COMPRESSOR #1	This selection turns the compressor on and off
HOT GAS SOL #1	This selection opens and closes the hot gas solenoid for barrel 1
PRODUCT SOL #1	This selection opens and closes the product solenoids and valves for barrel 1
CO2 VALVE #1	This selection opens and closes the CO_2 solenoic and valve for barrel 1
LLS VALVE #1	This selection opens and closes the Liquid Line solenoid and valve for barrel 1
BRL MOTOR #1	This selection turns the barrel 1 motor on and off

To move between one set of barrel parameters to the next, press the Right or Left arrow keys. This moves the highlight to the first entry of the second barrel, etc.

Totals Menu

The Totals menu (Figure 28) shows the cumulative run time of the system, a component of the system or an error. Some individual items may be reset, where available, by highlighting the item and pressing the RESET button. The RESET button is only displayed for items that may be reset, such as hours since the motor seal was changed or the number of compressor cycles. Pressing the BACK button returns to the Choose menu and saves the changes. The description of each item in the Totals list is shown in Table 25.

To move between one set of barrel parameters and the next, press the Right or Left arrow keys. This highlights the first entry of the second barrel, etc.

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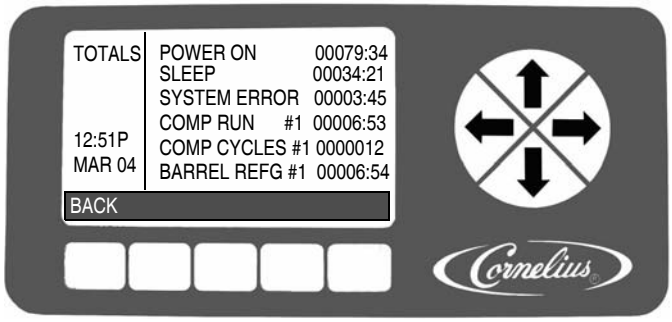

Figure 28. Totals Screen

Table 25

Display	Value	Description
POWER ON	HHHHH:MM	Shows how long the machine has been powered up
SLEEP	HHHHH:MM	Shows how long the machine has been in sleep mode
SYSTEM ERROR	HHHHH:MM	Shows how long the machine has had a system error
COMP RUN #1	HHHHH:MM	Shows how long the compressor has been running since the last reset
COMP CYCLES #1	########	Shows the number of compressor cycles since the last reset
BARREL REFG #1	HHHHH:MM	Shows how long the barrel has been in refrigeration mode
MOTOR ON #1	HHHHH:MM	Shows how long the motor has been running on a specific barrel
MOTOR SEAL #1	HHHHH:MM	Shows how long it has been since the motor seal was inserted on a specific barrel
DEFROST #1	HHHHH:MM	Shows how long the barrel has been in defrost mode
FILL CYCLES #1	########	Shows the number of times the barrel has filled with product
SYRUP RUN #1	HH:MM:SS	Shows how long the syrup solenoid has been open
SYRUP OUT #1	HHHHH:MM	Shows how long the syrup has been out
ERROR #1	HHHHH:MM	Shows how long the barrel has had an error

BRIX Setup Menu

BRIX is important to the quality of the final product. The BRIX menu facilitates the extraction of a sample of product from the unit for BRIX measurement. There is an automatic three second dispense of product that produces a constant volume so that a BRIX comparison can be made between samples. To perform a BRIX test, perform the procedure in Table 26.

Table 26

Step	Action	Procedure
1	Set status of barrels	Make sure the status of all barrels is OFF on the control display.
2	Remove drip tray/access panel	Remove the drip tray, loosen the two screws holding the access panel and remove it. (Figure 30)
3	Set product supply valve	Turn product supply valve to the 180 degree (BRIX) position for the barrel you are testing. (See Figure 31)

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Table 26

Step	Action	Procedure
4	Access BRIX menu	Press MENU. Then press the SETUP button.
5	Set barrel for BRIX	From the Setup screen (Figure 19), open the BRIX Setup screen, shown in Figure 29
6		Use the Up and Down arrows to highlight BRIX SETUP. Press the GO button at the bottom of the display.
7	Select barrel	Use the Up and Down arrows to highlight the desired barrel for BRIXing.
8	Perform BRIX procedure	Locate the appropriate barrel sample tube and hold a cup under it.
9		Open the valve at the end of the sample tube. Press the BRIX button, and wait 3-5 seconds. The product pump pumps product for approximately 3 seconds. After the sample is dispensed Press BRIX twice more to dispense product two more times. Discard all three of these samples.
10		Press the BRIX button a fourth time. Collect this sample in a cup and close the valve at end of the sample tube.
11	Measure BRIX	Place adequate amount of the product on a refractometer and read the BRIX value. A target BRIX reading of 13.0 (+/- 1.0) is normally desired for sugar-based syrups. Lower values for some diet syrups can be specified. Check with the syrup manufacturer if you are not sure.
12	Adjust BRIX	If BRIX is not within the proper range, adjust the syrup/water mixture by opening or closing the syrup valve, shown in Figure 32, and then retest.
13	Clear hose	When BRIX measurement is complete, press the valve on the bottom of the appropriate water solenoid to flush out the hose before closing the valve at the end of the hose.
14	Set product supply valve	Turn product supply valve back to the (BARREL) position for the barrel you tested. (See Figure 31)
15	Replace access panel	Replace the hoses and the access panel. Secure the panel with the two screws removed in Step 2. This completes the procedure.

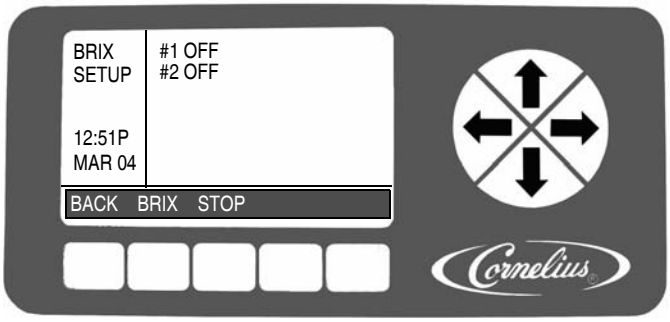

Figure 29. BRIX Setup Screen

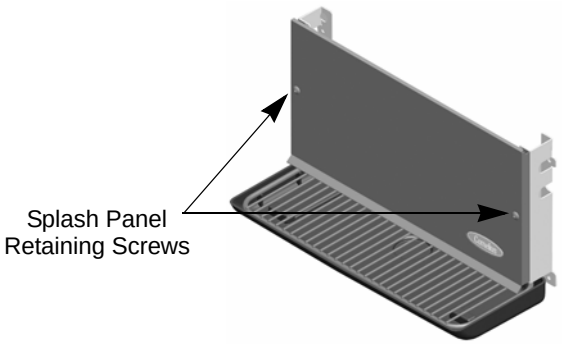

Figure 30. Splash Panel Mounting Screws

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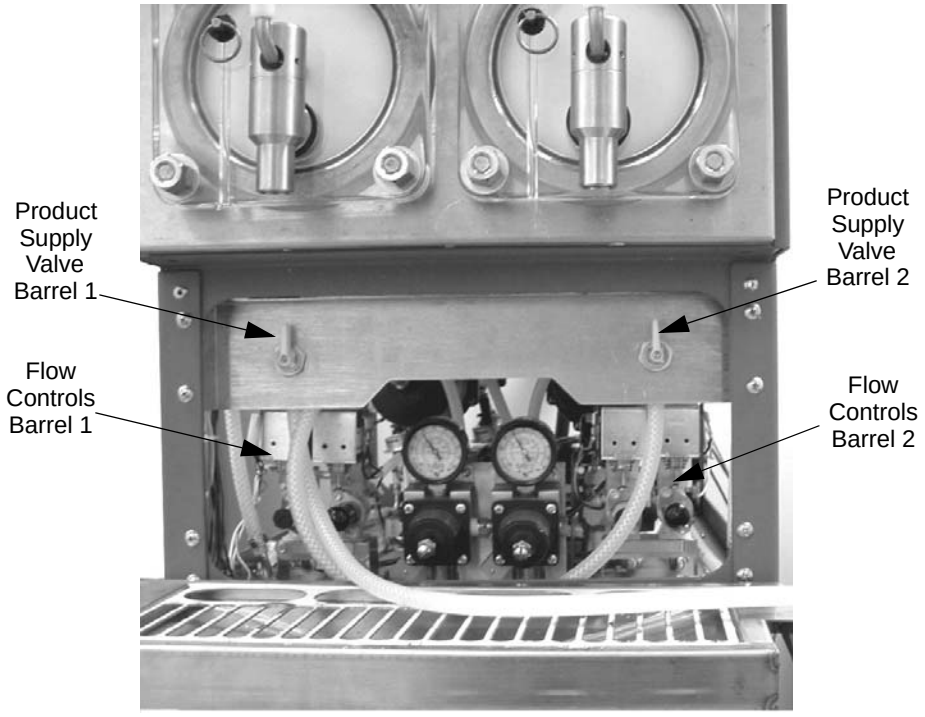

Valves shown in BARREL position w/ Splash Panel Removed

Figure 31. Product Control Valves (2-Barrel Unit)

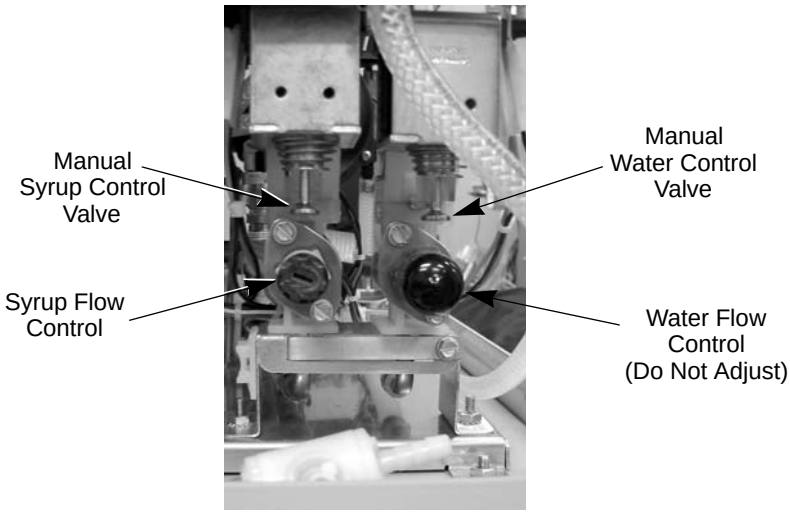

Figure 32. Flow Controls

Motor Setup Menu

Motor setup is initially done at the factory and does not need to be changed unless a barrel motor or barrel components are replaced, adjusted or removed and reinstalled.

This menu allows you to select different motor types for each barrel in the unit and run the calibration procedure on that motor. This procedure correlates the actual viscosity of the barrel and its contents with the electrical characteristics of

the motor. These characteristics are stored by the control system and are accessed at the time of calibration for each particular motor.

Because of the differences between motor characteristics from different motor suppliers, the Motor menu, shown in Figure 33, is used to adjust the unit settings to match the motor type being installed. It provides the correct table of electrical characteristics from imbedded settings located in non-volatile memory. Perform the procedure described in Table 29 to change the motor type setting. Insure that the motor type matches the settings listed in Table 27 based on model.

NOTE: If the Motor Type shown is "DEFAULT", it indicates that the EEPROM is not installed or is faulty.

Table 27

Model	Motor Type
All 60 Hz	1
All 50 Hz	2

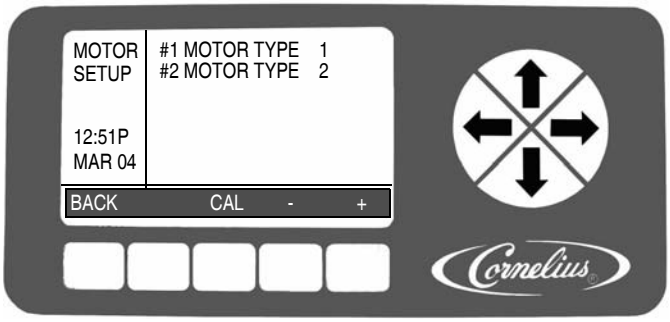

Figure 33. Motor Setup Screen

Table 28

Button	Description
BACK	Returns the display to the Select menu
CAL	Verifies the motor settings of a new motor.
-	Decrements the highlighted field
+	Increments the highlighted field

Table 29

Step	Action	Procedure
1	Set barrel for Motor Type	From the Maintenance menu (Figure 25), open the Motor Setup menu, shown in Figure 33.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select the proper motor type	Press the + or - buttons at the bottom of the display to select the proper motor type
4	Complete the procedure	Press the BACK button at the bottom of the display to save the settings and return to the Setup menu.

Calibrating a Motor

Calibration of motors is typically required when a motor or any associated barrel components (i.e., scrapper blades, seal, faceplate, etc.) is removed or replaced. Calibration establishes a new baseline for the motor assembly. This allows the system to determine proper viscosity settings for the new motor. When a new

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motor is installed in the unit or any of the barrel components are changed or adjusted, the motor should be calibrated by performing the procedure described in Table 30.

CAUTION: Calibration must be performed when the product in the barrel is completely liquid. There must not be any ice on the scraper blade.

Table 30

Step	Action	Procedure
1	Re-assemble barrel	It is VERY IMPROTANT that calibration be performed when the product in the barrel is in a 100% liquid state. There can be no ice in the barrel or on the beater bar.
2	Defrost the barrel	Select DFRST on the Barrel Status menu (Figure 14). It is **very important** that calibration be performed on a fully defrosted barrel (outlet temperature must be 41°F or barrel must be purged and refilled with new product).
3	Select Motor Setup	Use the Up and Down arrows to highlight MOTOR SETUP on the Maintenance menu.
4	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
5	Start calibration	Press the CAL button at the bottom of the Motor Setup menu to start the calibration process.
6		The calibration cycle continues for five (5) minutes to allow the gearbox to stabalize at temperature and ensure correct callibration. At that time the motor stops and it is calibrated.
7	Complete the procedure	Press the BACK button at the bottom of the display to return to the Maintenance menu.

System Menu

The System menu is used during production to set up the unit. It also allows the technician to view and change the number of barrels, the number of compressors and the number of pressure sensors present in the sytem, as shown in Figure 34. The description of these items is shown in Table 31.

NOTE: Changing these values to a number that doesn't match the physical number of items in the system generates errors or turns off some of the equipment present in the system.

When the individual fields are highlighted, the display buttons change. Refer to Table 32 for a listing of the button functions for the various field selections.

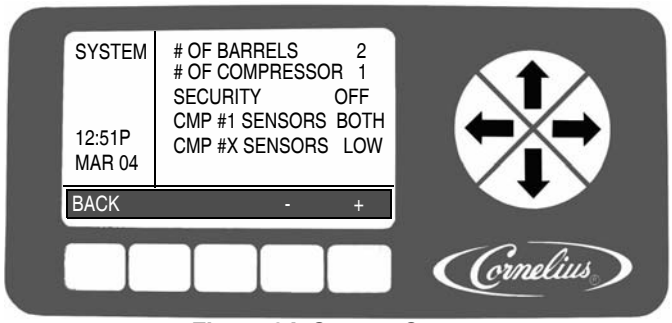

Figure 34. System Screen

Table 31

Display	Description
# OF BARRELS	This selection shows the number of barrels in the system and allows the user to change the quantity.
# OF COMPRESSORS	This selection shows the number of compressors in the sytem. Currently this number is fixed at one and cannot be changed.
SECURITY	This selection allows the user to turn security on or off.
CMP #X SENSORS	This selection allows the user to choose which pressure sensors are read for the compressor.

Table 32

Option	Button 2	Button 3	Button 4	Button 5
# of Barrels			-	+
# of Compressors			-	+
Security			OFF	ON
Compressor Sensors	NONE	LOW	HIGH	BOTH

Security

System security is located on the System menu. It allows a supervisor or service technician to keep unauthorized personnel from accessing the Maintenance menu. This feature is activated on the System menu. When security is turned on, users can only access the Main and Setup menus. The word LOCKED appears in the upper left corner of the display to inform users that security is enabled.

Pressing the extreme Left and Right buttons (Buttons 1 and 5) on the bottom of the display simultaneously and holding them for approximately five (5) seconds unlocks the Security menu. If security is left ON on the System menu, when the system times out or when the user goes back to the Main menu, security is re-activated and the Maintenance menu is not accessable. To disable security, access the System menu, highlight Security and press the OFF button.

Pressure Sensors

Pressure sensors allow the technician to view the high and low-side pressures in the refrigeration system without having to connect external gauges to the system. To view this information, go to the Unit Data screen shown in Figure 16 and press the UNIT button. The System screen, shown in Figure 35, is displayed.

The number and type of sensors in the unit are typically set at the factory and should not be changed. Data is only available on the sensors installed. If a sensor that is not installed in the unit is activated, incorrect data is displayed. It is possible to install sensors in the field, but it is not recommended because system refrigerant charge may be lost.

The low side pressure sensor is used to monitor compressor reversal. If it is not installed on the unit, the unit may not operate properly.

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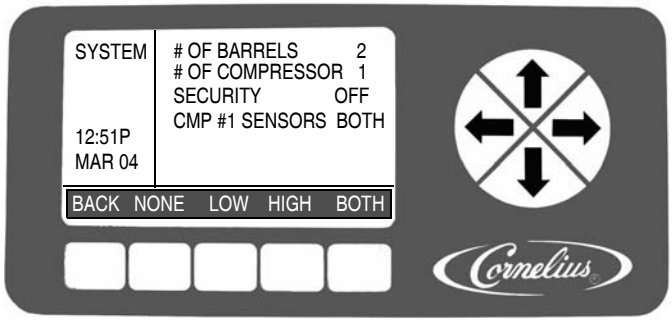

Figure 35. System Screen

When the pressure sensors selection is highlighted, pressing the NONE button removes the pressure readings from the Unit Data screen, shown in Figure 36. If LOW is selected, only the low pressure reading is displayed. If HIGH is selected, only the high pressure reading is displayed.

NOTE: If a pressure sensor is open, the pressure reading is 386 PSIG.

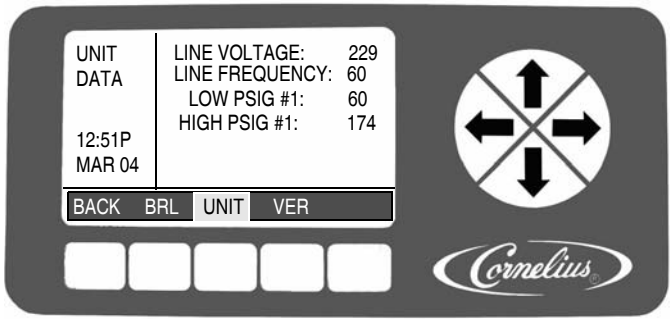

Figure 36. Unit Data Screen

OPERATION

MAINTAINING PRODUCT QUALITY

It has been determined that the following factors can affect the rate at which product quality diminishes (as indicated by a change in product appearance).

1. Dispensed Product Throughput
2. Programmed Defrost Scheduling
3. Viscosity Setting

Cornelius recommends the following instructions be read and followed relative to operating and establishing settings for the FCB equipment. Cornelius equipment service manuals contain instructions on how to program settings within the control system. Operators who have not been trained on servicing Cornelius FCB equipment should not attempt to modify equipment settings but should contact an accredited service provider.

Cornelius makes the following recommendations to help assure maximum product quality.

Dispensed Product Throughput

FCB equipment is designed to provide a high throughput of frozen carbonated product to meet peak draw demands. Where low product throughput is experienced, there is the potential for product quality to diminish. The information shown in Table 33 outlines the minimum throughput per barrel that must be dispensed on a 24 hour basis.

Table 33

Viper	Viscosity ≤ 4	Viscosity > 4
Volume of dispensed product per barrel per 24 hours required to maintain product quality.	48 oz.	60 oz

NOTE: Cornelius recommends that, in conditions where the FCB machine is operational and the minimum throughput (as described in Table 33 is not met on a per barrel basis, product should be dispensed and discarded to increase throughput and help assure that product quality is maintained.

NOTE: Data in Table 33 assumes equipment has been correctly installed, commissioned and calibrated as per directions contained in all technical literature published by Cornelius and the recommendations contained in this document have been followed.

Cornelius recommends that, in conditions where the FCB machine is operational and the minimum throughput is not met on a per barrel basis, product should be dispensed and discarded to increase throughput and help assure that product quality is maintained.

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Programmed Defrost Scheduling

The control system in the Viper system includes a function to automatically defrost product in the barrel at programmed intervals based on the viscosity of the product. Programmed defrosts are scheduled frequently to ensure that product quality within the barrel is maintained. Failure to defrost regularly during periods of low throughput allow increased ice crystal size, with a possible decrease in product quality. Regular throughput of dispensed product replenishs the barrel frequently with liquid and reduces the requirements for programmed defrosts. The unit automatically senses the lack of throughput and maintains the product quality by defrosting the barrels more frequently when throughput is slow.

Sleep Mode Recommendations

Cornelius recommends programming a sleep period for the machine during any amount of time over 3 hours that the unit is not used. This increases the life of the machine and reduces energy consumption.

A wakeup time must be programmed after the sleep period to return the unit to normal operation. Cornelius recommends programming the wakeup time for approximately 20 minutes before the product is needed. This is the time recommended if the ambient temperature is at 75°F. The times will vary depending on the ambient temperature (a higher ambient temperature requires more time for the product to cool).

Viscosity Setting

The control system includes a function to select the desired product viscosity. This function is referred to as “Viscosity Setting”. There are selectable viscosity ranges from 1-9. The higher the number selected, the more viscous the frozen product in the barrel becomes. This increased viscosity is achieved by freezing the product in the barrel to a lower temperature thereby increasing ice crystal size/growth. As the ice crystal size increases, however, there is potential for product quality to diminish.

Cornelius recommends that the viscosity settings be set at the lowest possible setting to achieve the desired drink quality. In most typical installations using a sugar-based syrup, acceptable drink quality can be achieved by programmed viscosity settings in the range of 3-5 for Viper.

Diet FCB syrups freeze much more readily than sugar based syrups, so the viscosity setting should be selected at the minimum value available (which is 1 or 2 for the Viper).

STARTING THE UNIT

The following table, Table 32, describes the basic procedure for starting the Viper. Refer to the Operator’s Manual (P/N 621260373OPS) for details on operation of the Viper unit.

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Table 32

Step	Action	Procedure
1.	Open the merchandiser	Open the merchandiser and expose the control panel.
2.	Turn on the barrels	Turn all barrels on by pressing the buttons labeled ON to start the normal refrigeration process.
3.	Close the merchandiser.	Close the merchandiser. In approximately 20 minutes, product is ready to serve.

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PREVENTATIVE MAINTENANCE

SUMMARY

There are no daily maintenance procedures required on the Viper unit other than normal cleanup of spills or overspray and emptying the drip tray. Normal equipment maintenance intervals are listed in Table 33. It is recommended that a preventative maintenance procedure be performed every six (6) months. This procedure should include all of the maintenance items described in Table 33 and the following sections.

Table 33

Preventative Maintenance Summary	
Maintenance Procedure	**Frequency of Maintenance**
Clean Air Filter	Monthly or more often, as necessary (See Table 34)
Check BRIX	Every six months or when changing syrup types (See “BRIX Setup Menu” on page 37.)
Seal Change	Every six months
Clean Condenser Coil	Every six months or as necessary
Sanitize Unit	Every six months or when changing syrup types
Check Water Filter	Every six months or if water pressure in the system is low.
Change or Rotate Scraper Blades	Every six months
Check for Leaks	Every six months
Clean BIB Connectors & check operation of syrup sold out switches	Every six months or when changing syrup types.
Check Clock Setting	Every six months or when changing to or from daylight savings time
Change caged o-ring on models w/ Motorman Valves.	Every six months or when changing syrup types.

CAUTION — Only trained and certified electrical, plumbing and refrigeration technicians should service this unit. ALL WIRING AND PLUMBING MUST CONFORM TO NATIONAL AND LOCAL CODES.

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MONTHLY MAINTENANCE

A general inspection of the machine for leaks and cleanliness should be done on a weekly basis. Any abnormal conditions should be reported and corrected when noticed.

Cleaning Air Filter

The air filter should be cleaned at least once a month (more often in harsh environments). Perform the procedure in Table 34 to clean the air cleaner.

Table 34

Step	Action
1.	Open the merchandiser
2.	Remove the filter, shown in Figure 37, by grasping the two tabs and sliding it straight out the front of the unit.
3.	Wash the filter with clean water. Shake out the excess water.
4.	Reinstall the air filter, mesh side down.
5.	Close the merchandiser.

Figure 37. Air Filter Location

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SEMI-ANNUAL MAINTENANCE

There are several procedures that should be completed on a semi-annual basis. There procedures help to insure proper operation of the system on a long term basis. Refer to Table 33 for a listing of the semi-annual maintenance items.

Inspecting and Replacing Scraper Blades

Scraper blades should be inspected for wear during the semi-annual maintenance check. To inspect the blades, perform the procedure in Table 35

Table 35

Step	Action
1.	See “Purging a Barrel” on page 34.
2.	When purging is complete, remove power from the unit.
3.	Remove the four (4) 3/4 in. nuts from the faceplate and slowly remove the faceplate from the unit.
4.	Slowly pull the blade assembly out of the barrel.
5.	Rinse and inspect the blade assembly for signs of wear.
6.	If there is significant wear on the blades, Reverse or replace them, depending on the wear pattern.
7.	Replace the blade assembly and bushings (PN 2392) onto the motor shaft in the barrel.
8.	Re-install the faceplate and replace the four (4) mounting nuts. Hand tighten the nuts untill the faceplate makes contact with the gasket, then use a wrech to tighten the nuts an additional 1/4 turn. Be careful not to over tighten the nuts or cracking of the faceplate may result.
9.	Refill the barrel with product. See “Filling a Barrel” on page 34.
10.	When barrel fill is complete, perform a motor calibration. See “Calibrating a Motor” on page 40.

Cleaning the Syrup Connections

Syrup connections should be cleaned at least every six months, or when syrup types are changed. Perform the procedure in Table 36 to clean the BIB connectors.

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Table 36

Step	Action
1.	Open the merchandiser and select OFF for the barrel to be cleaned.
2.	Remove the quick disconnect from the BIB container.
3.	Fill a suitable pail or bucket with soap solution.
4.	Submerge the disconnect in the soap solution and then clean it using a nylon bristle brush. (Do not use a wire brush). Rinse with clean water and dry.

Servicing Motorman Dispensing Valves

NOTE: Dispensing valves with caged o-rings should be serviced (lubricated) every six months and o-rings should be replaced once a year.

Refer to Figure 39 and perform the procedure in Table 37 to lubricate or change the caged o-rings in each dispensing valve on the unit.

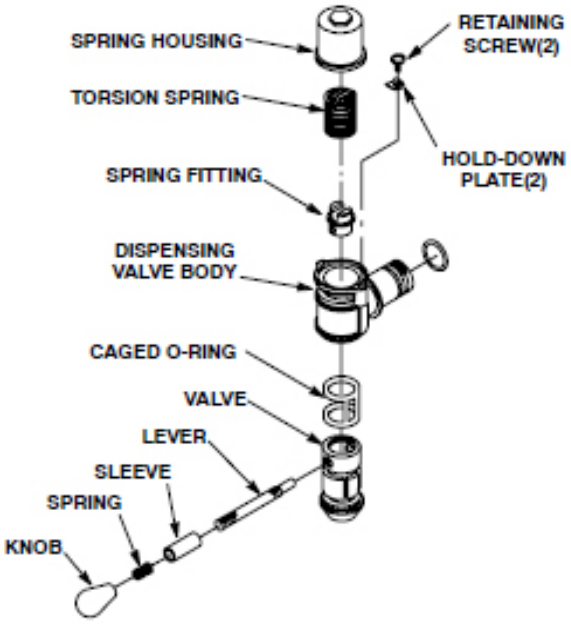

Figure 38. Self-Closing Dispensing Valve

Table 37

Step	Action
1.	Defrost freeze cylinders, shut unit down, disconnect electrical power from Unit.
2.	Perform the procedure in Table 38 to empty the barrels.
3.	Remove the hex nuts and flat washers securing the faceplate to the freeze barrel, then remove the faceplate from the barrel.

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Table 37

Step	Action
4.	Carefully remove the large o-ring from the faceplate.
5.	Unscrew the relief valve from the faceplate.
6.	Disassemble the dispensing valve (see Figure 38).
7.	Remove the two screws and hold-down plates securing the spring housing to the dispensing valve body, then remove the housing.
8.	Remove the torsion spring from the dispensing valve.
9.	Remove the knob, spring, sleeve, and lever from the dispensing valve.
10.	Remove spring fitting from dispensing valve.
11.	Press the valve with the caged O-ring, down and out of the dispensing valve body.
12.	Carefully remove the caged O-ring from the valve.
13.	Wash all the parts in warm water. Remove all traces of syrup and lubricant, especially from the faceplate, o-rings, and dispensing valve. If parts are excessively coated, wipe clean with a paper towel to remove excess syrup and lubricant, especially from caged o-ring and dispensing valve. Use a brush (provided with the unit) to clean the faceplate relief valve passages.
14.	Submerge all the parts in a 4-percent solution of approved sanitizing agent for the amount of time recommended by the sanitizer manufacturer.
15.	Remove the parts from the sanitizing solution and place them on clean paper towels.
16.	Assemble the dispensing valve.
17.	Lubricate the caged o-ring. Carefully install the caged o-ring onto the valve from the straight end (opposite tapered end). Lubricate the grooves that the o-ring rides to fill in all void areas around the o-ring.
18.	Carefully install the valve with the caged o-ring in the dispensing valve body.
19.	Install the spring fitting, knob and lever parts, torsion spring and spring housing assembly by reversing the removal procedure. **Do not** tighten down the hold-down plates securing the spring housing at this time.
20.	After re-installing the faceplate, turn the dispensing valve spring housing to the left (counterclockwise) to put tension on the tension spring. Apply just enough tension so that the dispense valve shaft returns to the closed position after release. **Do not overtighten.** Overtightening results in a high activation force on the valve.

NOTE: Use Dow-Corning DC-111 (P/N 321471000) light grade silicone lubricant to lubricate the o-rings.

Sanitizing the System

The syrup systems should be sanitized every 180 days by a qualified service technician following the sanitizer manufacturer's recommendations or when changing syrup types.

The sanitizing process consists of emptying the barrel, washing the lines and barrel, cleaning the BIB connectors, rinsing and refilling the system.

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Emptying a Barrel

To empty the barrel, perform the procedure in Table 38.

Table 38

Step	Action
1.	From the Barrel Status menu, press the DFRST button.
2.	When the barrel is defrosted, go to the Maintenance menu. If the security feature is active, access the Maintenance menu by by pressing and holding the far left and right buttons simultaneously for approximately five seconds.
3.	Remove the splash panel. See “BRIX Setup Menu” on page 37.
4.	Turn the Product/BRIX valve 90 degrees clockwise to shutoff product to the barrel.
5.	Place a large waste container under the dispense valve and drain as much product as possible from the barrel.
6.	When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to repressurize the barrel with CO_2. As product level lowers in the barrel, partially close the valve to avoid spurting.
7.	Disconnect the BIB from the unit.

NOTE: The unit should be sanitized every 180 days by a qualified service technician following the sanitizer manufacturer’s recommendations.

Flushing the System of Syrup

After emptying the barrel, the barrel should be flushed of product before proceeding with the sanitizing procedure. Perform the procedure in Table 39.

Table 39

Step	Action
1.	Fill a clean 5-gallon pail with plain water.
2.	Connect a sanitizing fitting (p/n cc 28688) to the BIB connector. Put the connector in the bucket of water.
3.	Make sure the Product/BRIX valve is in the BRIX position.
4.	Hold a waste container under the brix tube to collect syrup from the syrup line and open the manual syrup flow valve (see Figure 32) to start filling the syrup line with plain water. Continue to hold the manual syrup flow valve open until clean water starts coming out of the BRIX tube.
5.	Release the manual syrup flow valve and turn the Product/BRIX valve to the Product position.
6.	Open the manual water flow valve (see Figure 32) to start filling the barrel with water. At the same time, open the faceplate relief valve until water comes out.
7.	When the barrel is full, press the SPIN button on the Barrel Status menu, while highlighting the appropriate barrel. This starts the scraper blade. Allow blade to operate for fifteen seconds.
8.	Turn barrel OFF by pressing the OFF button.
9.	Place a waste container under the barrel dispensing valve. Open the dispensing valve and dispense all wash water from the barrel. When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO_2. As the wash water level lowers in the barrel, partially close the valve to avoid spurting.

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Table 39

Step	Action
10.	Perform rear barrel seal replacement. See “Barrel Motor Seal Replacement” on page 56.
11.	Perform inspection and replacement of scraper blades. See “Inspecting and Replacing Scraper Blades” on page 49.
12.	Perform a leak test on the barrel. See “Motor Seal Leak Test” on page 58.

Sanitizing the Barrel

Sanitize the syrup system and barrel by performing the procedure shown in Table 40.

Table 40

Step	Action
1.	Use a clean 5-gallon pall filled with a sanitizing solution and water at a temperature of 90º F to 110º F (32º C to 43º C). The sanitizing solution must have 200-ppm available chlorine.
2.	Connect a sanitizing fitting (p/n cc 28688) to the BIB connector. Put the connector in the bucket of sanitizing solution.
3.	Make sure the **Product/BRIX** valve in the **BRIX** position.
4.	Hold waste container under the BRIX tube to collect flush water from the syrup line and open the manual syrup flow valve to start filling the syrup line with sanitizing solution. Continue to hold the syrup flow valve open until sanitizing solution starts coming out of the BRIX tube.
5.	Turn the **Product/BRIX** valve in the **Product** position.
6.	Manually override (open) the syrup flow valve to fill the barrel with sanitizing solution.
7.	Fill the barrel with sanitizing solution by opening the faceplate relief valve until sanitizing solution comes out of the relief port.
8.	Hold a 16 oz. cup under the dispense valve. Hold the dispense valve fully open until the cup is full.
9.	Use the brush provided with the unit to clean the relief port and clean the outlet of the dispense valve with sanitizing solution.
10.	From the **Barrel Status** menu, press the **SPIN** button while highlighting the appropriate barrel. This starts the scraper blade. Allow blade to operate for minimum of 10, but no more than 15 minutes. Turn the scrapper blade off by pressing the **OFF** button.
11.	Place a large container under the dispense valve and drain as much sanitizing solution as possible from the barrel.
12.	When the pressure in the barrel drops, from the **Barrel Maintenance** menu, press the **PURGE** button to re-pressurize the barrel with CO_2. As sanitizing solution level lowers in the barrel, partially close the valve to avoid spurting.

Flushing the System

Flush the wash water from the system by performing the procedure in Table 41.

CAUTION — Flush the system thoroughly, residual sanitizing solution left in the system may create a health hazard.

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Table 41

Step	Action
1.	Turn the Product/BRIX valve to the Product position.
2.	Manually open the manual water flow valve to start filling the barrel with wash water. At the same time, open the faceplate relief valve until water comes out.
3.	From the Barrel Status menu, press the SPIN button while highlighting the appropriate barrel. This starts the scraper blade. Allow the blade to operate for fifteen seconds, then turn barrel OFF by pressing the OFF button.
4.	To drain the water from the system, turn the barrel OFF.
5.	Place a container under the barrel dispensing valve. Open the dispensing valve and dispense all rinse water from the barrel. When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO_2. As the wash water level lowers in the barrel, partially close the valve to avoid spurting.
6.	Remove the sanitizing fitting (p/n cc 28688) from the BIB connector and connect a BIB containing syrup to the syrup line.
7.	Rotate the Product/BRIX valve to the BRIX position and open the valve at the end of the tube.
8.	Hold a waste container under the BRIX tube to collect the sanitizing solution from the syrup line and open the manual syrup flow valve to start filling the syrup line with syrup. Continue to hold open the syrup flow valve until syrup starts coming out of the BRIX tube.
9.	Perform a BRIX setup. See “BRIX Setup Menu” on page 37.
10.	Fill the barrel with product as described in Table 21.
11.	Perform motor calibration. See “Calibrating a Motor” on page 40.

Cleaning the Water Filter

The water filter screen in the rear of the unit should be removed and cleaned every six months, during the preventative maintenance procedures. To inspect and clean the filter screen, perform the procedure in Table 42. Refer to Figure 39 for water filter location.

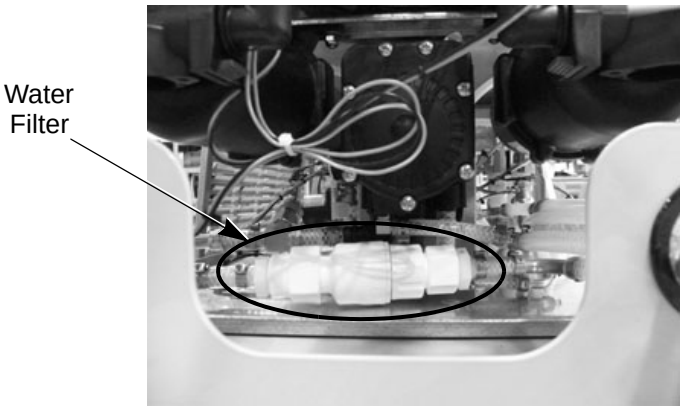

Figure 39. Water Filter Location

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Table 42

Step	Procedure
1.	Disconnect power from the unit.
2.	Turn off and disconnect the water supply to the unit.
3.	Remove the rear cover of the unit.
4.	Disassemble the water filter. (Use two wrenches, if necessary)
5.	Remove the filter and rinse it under running water to remove any debris.
6.	Reassembe the filter.
7.	Connect and turn on the water supply to the unit.
8.	Check the filter for any leaks.
9.	Replace the rear cover.
10.	Reconnect power to the unit.

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COMPONENT REPLACEMENT

The following are procedures for servicing the major components of the Viper system.

BARREL MOTOR SEAL REPLACEMENT

The barrel motor seal is typically replaced during the semi-annual preventative maintenance procedure. The seal location is shown in Figure 40.

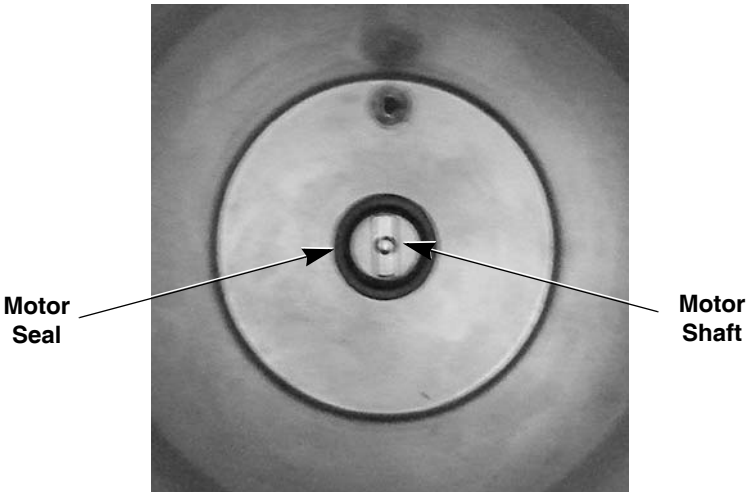

Figure 40. Front View Inside of Barrel w/ Faceplate off

Removing the Existing Seal

To remove the existing barrel seal, perform the procedure in Table 42.

Table 42

Step	Action
1.	Purge the barrel. See “Purging a Barrel” on page 34.
2	When purging is complete, disconnect power from the unit.
3	Open the relief valve on the front of the barrel to ensure that pressure is released. **CAUTION:** Barrel pressure **MUST** be relieved before removing the faceplate!
4	Remove the four (4) 3/4 in. nuts from the faceplate and slowly remove the faceplate from the unit.
5	Carefully pull the blade assembly out of the barrel.
6	Remove any remaining product from the barrel.
7	Rinse and inspect the blade assembly and barrel for signs of wear. (Replace if necessary)
8	Remove the seal and spacer from the rear of barrel.
9	When old seal and spacer are removed, use a clean soft cloth to clean between the motor shaft and the barrel to remove any remaining product.

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Installing a New Seal

Perform the procedure in Table 43, Figure 41 and Figure 42 to replace the barrel seal with a new seal. When installing a new seal, **NEVER** use oil or silicon based lubricants. This can cause the new seal to rotate and **LEAK!**

Table 43

Step	Action
1	Remove the old seal and the spacer (see Table 42).
2	Remove the new seal from its packaging.
3	Clean the spacer.
4	Slide the spacer (with slots toward the motor housing) over the motor shaft.
5	Lubricate the inside of the seal using Dow Corning 111 Lubricant and Sealant. (Note, Do not lubricate the static side(outer portion) of the seal. This could cause the seal to rotate in the bore and leak.)
6	Carefully slide the seal over the motor shaft and press it firmly until is fully seated against the spacer and the seal cannot be pushed any further.
7	Run your finger around the perimeter of the seal to insure it is flush against the back of the barrel.
8	Reinstall the blade assembly. Rotate the assembly while inserting it to insure that it is fully seated on the motor shaft. (Figure 30)
9	Lubricate the faceplate o-ring.
10	Re-install the faceplate and replace the four (4) mounting nuts. Hand tighten the nuts until the faceplate makes contact with the gasket, then use a wrench to tighten the nuts an additional 1/4 turn. Be careful not to overtighten the nuts or cracking of the faceplate may result.
11	Clean the drip tray and tube using warm water.
12	Perform the seal leak test in Table 44.

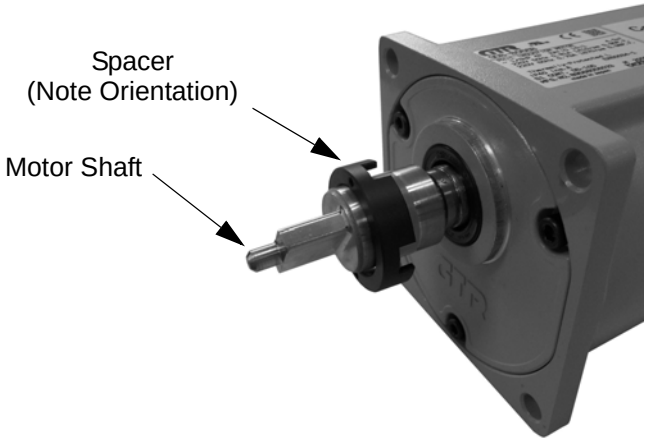

Figure 41. View of Motor Shaft with Spacer on Shaft

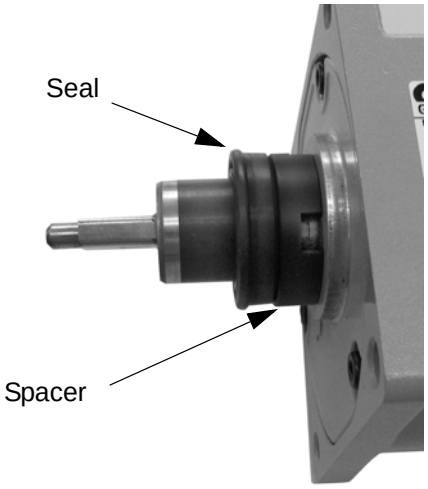

Figure 42. Side View of Seal and Spacer on Motor Shaft

Motor Seal Leak Test

After replacing the motor seal, it is advisable to test the seal under pressure before refilling the barrel with product. Perform the procedure in Table 44 to verify that the seal is installed properly and not leaking. When the seal passes the leak test, perform the motor calibration routine on page 40.

Table 44

Step	Action
1	Turn the 3-way Product Supply valve behind the splash panel (see Figure 31) to the Off (horizontal) position.
2	From the Maintenance menu, press the FILL button for the barrel. This pressurizes the barrel with CO_2.
3	Observe the water and syrup fill solenoids.
4	If there are NO seal leaks, these solenoids cycle off within a minute and remain off.
5	If the solenoids cycle off and remain off, the barrel seal is not leaking and the barrel is ready to be filled with product.
6	If the solenoids do not cycle off, or cycle off and on, the seal is leaking and the seal installation process described in Table 42 and Table 43 must be repeated.
7	If there are no leaks, turn the 3-way Product Supply valve to the BRIX position.

Barrel Motor Replacement

The barrel motor does not require any special alignment when being replaced. It mounts on four (4) bolts. These bolts are screwed into threaded bosses in the foam pack barrel assembly, as shown in Figure 43. To replace a barrel motor, perform the procedure in Table 45.

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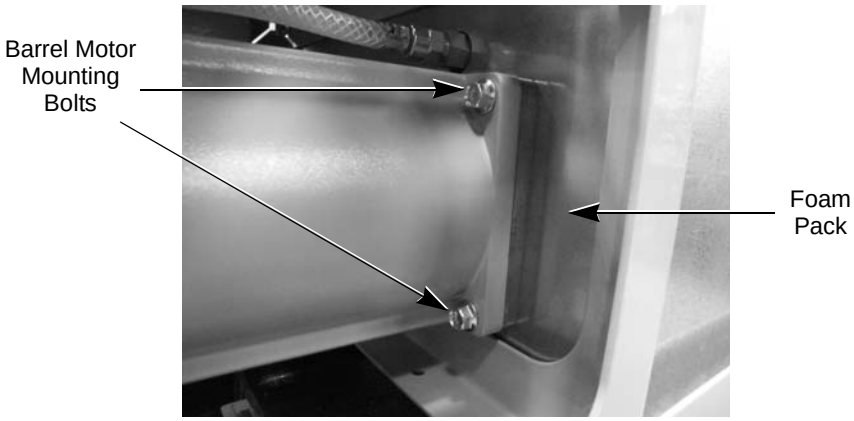

Figure 43. Side View of Motor Showing Two of the Four Mounting Bolts

Table 45

Step	Action
1	Perform the procedure in Steps 1 through 8 of Table 42.
2	Disconnect the motor from the circuit by unplugging the connector.
3	Remove the motor by removing the four (4) bolts holding the motor to the barrel assembly.
4	Install the replacement motor and connect the connector.
5	Replace the motor seal, scraper blade assembly onto the motor shaft in the barrel, as described in Table 42.
6	Reconnect power to the unit.
7	Refill the barrel with product. See “Filling a Barrel” on page 34.
8	When barrel fill is complete, perform a motor calibration. See “Calibrating a Motor” on page 40.

MOTOR RUN CAPACITOR REPLACEMENT

The motor run capacitors, shown in Figure 44, are mounted at the rear of the unit between the barrel motors. To replace a run capacitor, perform the procedure in Table 46.

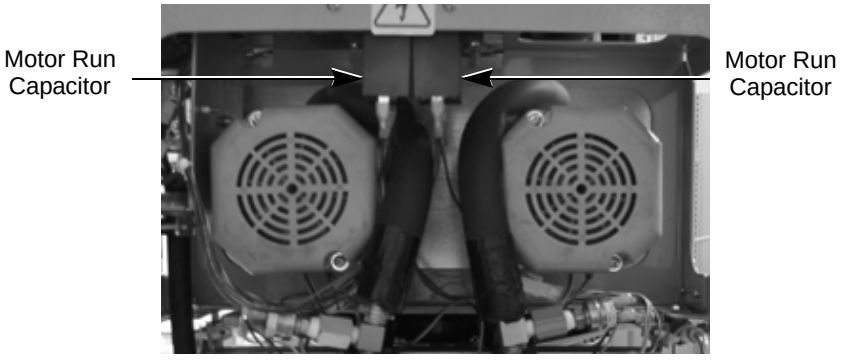

Figure 44. View of Motor Run Capacitors

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Table 46

Step	Action
1	Disconnect power from the unit.
2	Remove the rear cover.
3	Disconnect the spade clips from the defective capacitor.
4	Remove the mounting screw from the base of the capacitor.
5	Replace the capacitor.
6	Reverse the procedure to install the new capacitor.
7	Reconnect power to the unit.
8	Refill the barrel with product. See “Filling a Barrel” on page 34.
9	When barrel fill is complete, perform a motor calibration. See “Calibrating a Motor” on page 40.

WATER PUMP REPLACEMENT

The water pump is located just behind the water filter in the center of the unit. It is mounted on a bracket facing the rear of the unit. To replace the pump, perform the procedure in Table 47.

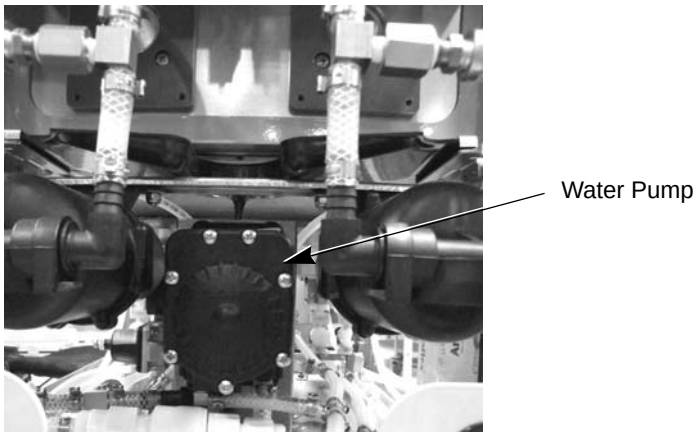

Figure 45. Rear View of Water Pump

Table 47

Step	Action
1	Disconnect power from the unit.
2	Remove the rear cover and the side panels.
3	Disconnect the CO_2 supply from the unit.
4	Remove and drain the water supply from the unit.
5	Disconnect the quick disconnect input and output water lines from the bottom of the pump.
6	Disconnect quick disconnect CO_2 input from the bottom of the pump.
7	Remove the four (4) screws and locknuts holding the pump to the mounting bracket.

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Table 47

Step	Action
8	Replace the pump.
9	Reverse the procedure to install the new pump.

CO_2 Shutoff Solenoid Replacement

The CO_2 shutoff valves and solenoids, shown in Figure 46, are located near the center of the unit and are mounted on a bracket to the bottom of the chassis. They control the injection of CO_2 with the syrup/water combination to provide the final mixture for the product. There are one of these solenoids for each barrel in the system. When working in this area, care should be taken not to damage or misalign the CO_2 metering orfice. To replace one of these solenoids, perform the procedure in Table 48.

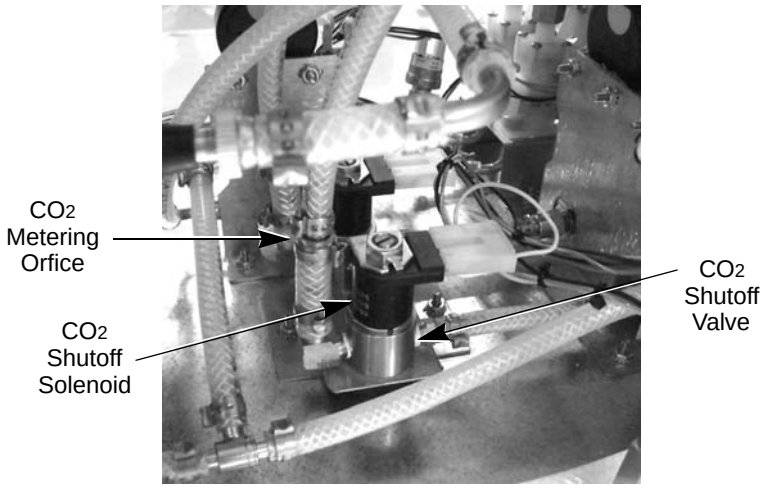

Figure 46. Side View of CO_2 Shutoff Solenoid (2 Barrel Unit)

Table 48

Step	Action
1	Disconnect power from the unit.
2	Disconnect the CO_2 supply from the unit.
3	Remove the rear cover and side panels.
4	Carefully remove the tubing from the right-angle fitting at the rear of the valve. Be sure not to damage the CO_2 metering orfice located above the fitting (Figure 46).
5	Remove the tubing from the front of the valve.
6	Remove the two (2) locknuts mounting the valve and solenoid to the base.
7	Remove the two (2) mounting screws from the bottom of the mounting bracket.
8	Replace the valve and solenoid.
9	Reverse the procedure to reinstall the valve and solenoid into the unit.
10	Test the unit for CO_2 leaks.

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Table 48

Step	Action
11	Replace the rear and side panels.
12	Reconnect power to the unit.

SYRUP AND WATER SHUTOFF SOLENOID REPLACEMENT

The syrup and water shutoff valves and solenoids are mounted on a single bracket, as shown in Figure 47. Perform the procedure in Table 49 to replace the valves.

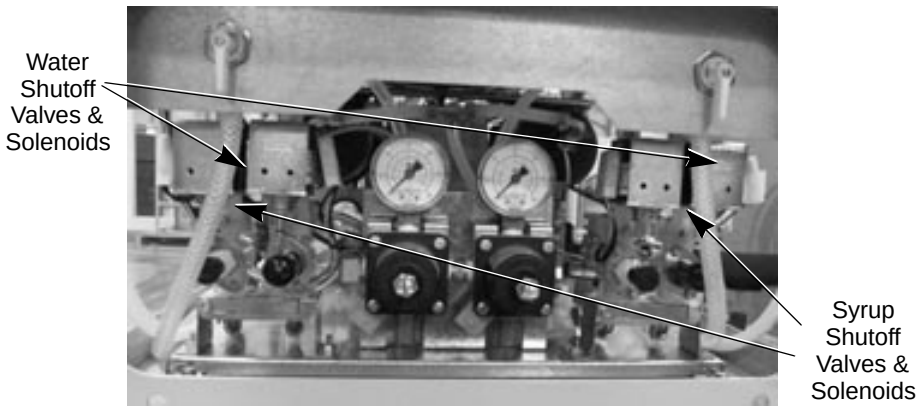


Figure 47. View of Shutoff Solenoids w/ Access Panel Removed (2 Barrel Unit)

Table 49

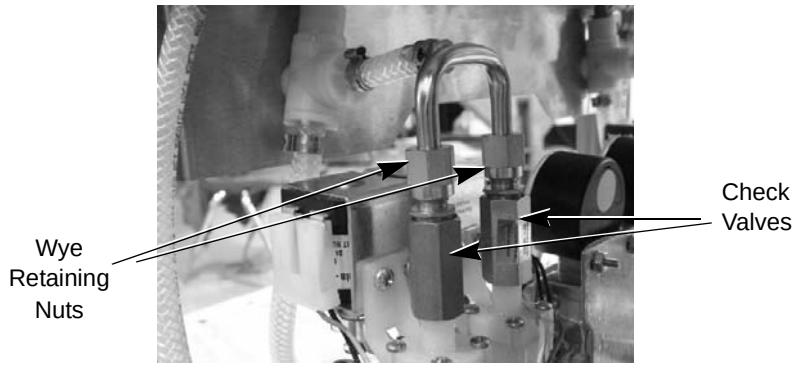
Step	Procedure
1	Disconnect power from the unit.
2	Disconnect and bleed the water and syrup lines to remove pressure from the system.
3	Remove the rear cover and side panels.
4	Remove the water and syrup lines from the input to the valves.
5	Remove the Wye tube from the output (top) of the valves by loosening the nuts between the Wye and the check valves. 

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Table 49

Step	Procedure
6	Remove the two (2) locknuts from the base of the assembly and remove it from the unit.
7	Remove the check valve from the valve being replaced.
8	Install the check valve on the new valve and solenoid.
9	Remove the valve and solenoid from the mounting bracket and replace it.
10	Reverse the procedure to reinstall the bracket into the unit.
11	Reconnect power to the unit and test the system.

CO_2 Regulator Replacement

The CO_2 regulators are located at the center of the unit in back of the access panel, as shown in Figure 48. To replace the regulators, perform the procedure in Table 50.

Figure 48. Front view of CO_2 Regulators w/ Access Panel Removed (2 Barrel Unit)

Table 50

Step	Action
1	Disconnect power from the unit.
2	Remove the access panel (two (2) screws) and the right side panel.
3	Turn off the CO_2 source and then turn the Product valve 90 degrees to the off position.
4	Relieve pressure in the barrel by opening the relief valve on the faceplate of both barrels.
5	Disconnect the three (3) supply lines at the rear of the regulators using a small wrench.
6	Remove the two lock nuts from the mounting bracket in back of the regulators.
7	Remove the pressure switch wires from the regulators.

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Table 50

Step	Action
8	Remove the assembly and replace the defective regulator.
9	Reverse the procedure to install the regulator assembly.
10	Check the system for leaks after repressurizing the system.
11	Reset the regulator to the desired setting.

CONDENSER FAN MOTOR REPLACEMENT

The fan motor is located on the top of the unit, as shown in Figure 49. If the motor needs replacement, perform the procedure in Table 51 to remove and reinstall a motor.

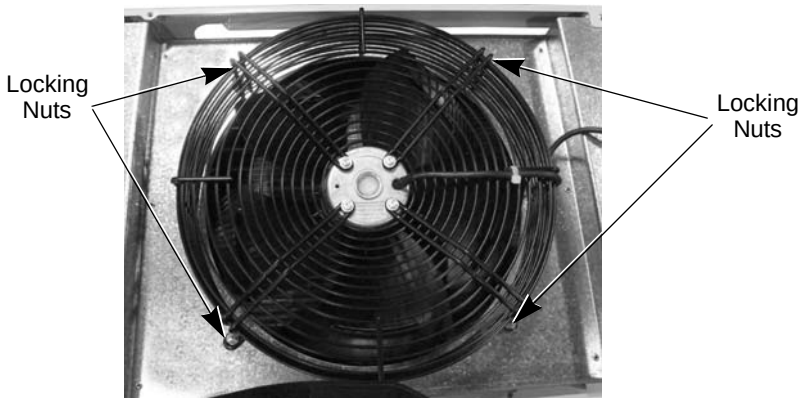

Figure 49. Condenser Fan Mounting Nuts

Table 51

Step	Action
1	Disconnect power from the unit.
2	Disconnect the fan by unplugging the connector.
3	Remove the four locking nuts securing the fan to the top of the condenser.
4	Lift the fan and shroud off the unit.
5	Remove the four screws and washers securing the fan to the shroud.
6	Replace the fan.
7	Reverse the procedure to install the new fan.
8	Reconnect power to the unit.

COMPRESSOR REPLACEMENT

Caution should be used when working with refrigerants. To replace a compressor, perform the procedure in Table 52.

NOTE: Be sure to reclaim refrigerant when replacing compressor.

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Table 52

Step	Action
1	Disconnect power to the unit.
2	Remove the rear cover and side panels.
3	Label and disconnect all wires from the compressor.
4	Remove the four (4) mounting nuts from the base of the compressor.
5	Remove all insulation from around fittings.
6	Unsweat the suction line from the compressor.
7	Cut the discharge line on top of the compressor (Make sure line can be spliced back together.)
8	Remove the compressor and unsweat the discharge line.
9	Reverse the procedure to install the new compressor.
10	Replace the dryer.
11	Evacuate the system and recharge it according to the Cornelius nameplate on the unit.
12	Replace the side panels and rear cover.
13	Reconnect power to the unit and test the unit.

HOT GAS SOLENOID REPLACEMENT

The hot gas valves and solenoids, shown in Figure 50, are located near the center of the unit on the right and left sides. Whenever a hot gas valve and solenoid is replaced, the dryer should be replaced at the same time.

Figure 50. Hot Gas Solenoid (1 per barrel)

Table 53

Step	Action
1	Disconnect power from the unit.
2	Remove the side panels.
3	Reclaim refrigerant from the system.
4	Carefully remove the insulation and remove the hot gas valve and solenoid.
5	Replace the hot gas valve and solenoid.
6	Replace the insulation around the valve and solenoid.

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Table 53

Step	Action
7	Replace the filter-dryer.
8	Evacuate the system.
9	Restore the proper refrigerant charge to the system and verify proper system operation.

LIQUID LINE SOLENOID REPLACEMENT

The liquid line valves and solenoids, shown in Figure 51, are located near the center of the unit on the right and left sides. Whenever a liquid line valve and solenoid is replaced, the dryer should be replaced at the same time.

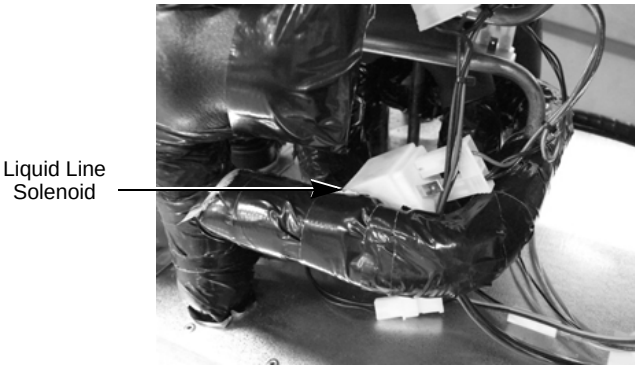

Figure 51. Liquid Line Solenoid (1 per barrel)

Table 54

Step	Action
1	Disconnect power from the unit.
2	Remove the side panels.
3	Reclaim refrigerant from the system.
4	Carefully unwrap the foam insulation from around the valve and solenoid.
5	Remove the liquid line valve and solenoid.
6	Replace the liquid line valve and solenoid and insulation.
7	Replace the filter-dryer.
8	Evacuate the system.
9	Restore the proper refrigerant charge to the system and verify proper system operation.

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SYRUP PRESSURE SWITCH REPLACEMENT

The syrup pressure switches (Sold Out Indicators) are located along the left and right sides of the unit near the front. There is one switch for each barrel in the system. Figure 52 shows the syrup pressure switch on the left side of the unit. To replace the syrup pressure switch, perform the procedure in Table 55.

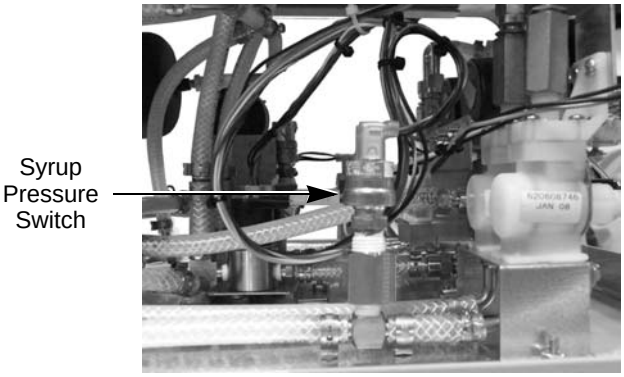

Figure 52. View of Syrup Pressure Switch and Valve

Table 55

Step	Action
1	Disconnect power to the unit
2	Remove the appropriate side panel.
3	Turn off the syrup supply to the unit.
4	Drain the syrup from the system.
5	Disconnect the wires on the pressure switch.
6	Remove the switch, using two wrenches.
7	Replace the switch with a new unit.
8	Reverse the procedure to install the new switch.
9	Restore the syrup supply and check for leaks.
10	Check switch operation.

WATER PRESSURE SWITCH REPLACEMENT

The water pressure switch, shown in Figure 53, is located in back of the water filter, when viewed from the rear of the unit. Access to the switch is obtained by removing the left side panel of the unit, when viewed from the rear. To replace the water pressure switch, perform the procedure in Table 56.

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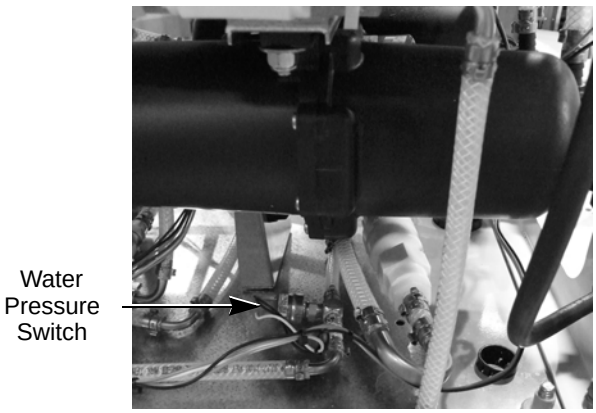

Figure 53. View of Water Pressure Switch

Table 56

Step	Action
1	Disconnect power from the unit.
2	Remove the side panel from the unit.
3	Turn off the water supply to the unit.
4	Drain the water from the system.
5	Disconnect the wires from the switch.
6	Remove the switch, using two wrenches.
7	Replace the switch with a new unit.
8	Reverse the procedure to install the new switch.
9	Restore the water supply and check for leaks.
10	Check to ensure that the new switch is working properly.

DISPLAY BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The display board is located on the back of the control panel display. It is mounted to the panel with four (4) phillips head screws, shown in Figure 54.

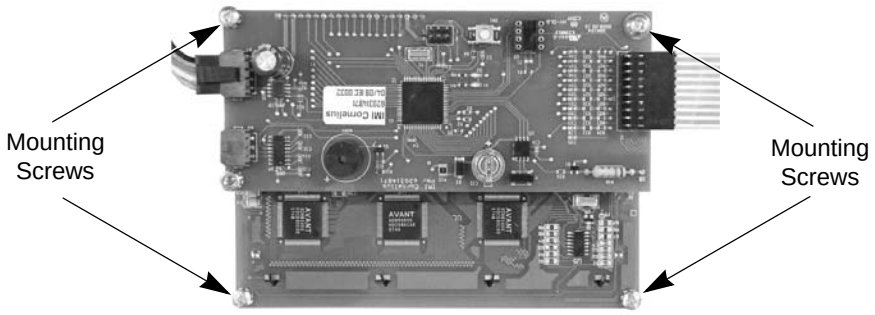

Figure 54. View of Display Board

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Table 57

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.
3	Unplug the two (2) connectors from the display board.
4	Remove the four (4) screws from the corners of the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

CONTROL BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The control board is located in the E-Box. It is mounted to the panel on four (4) plastic mounting studs, shown in Figure 55.

Table 58

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.
3	Unplug the eight (8) connectors from the control board.
4	Squeeze each of the mounting studs at the corners of the board while carefully lifting the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

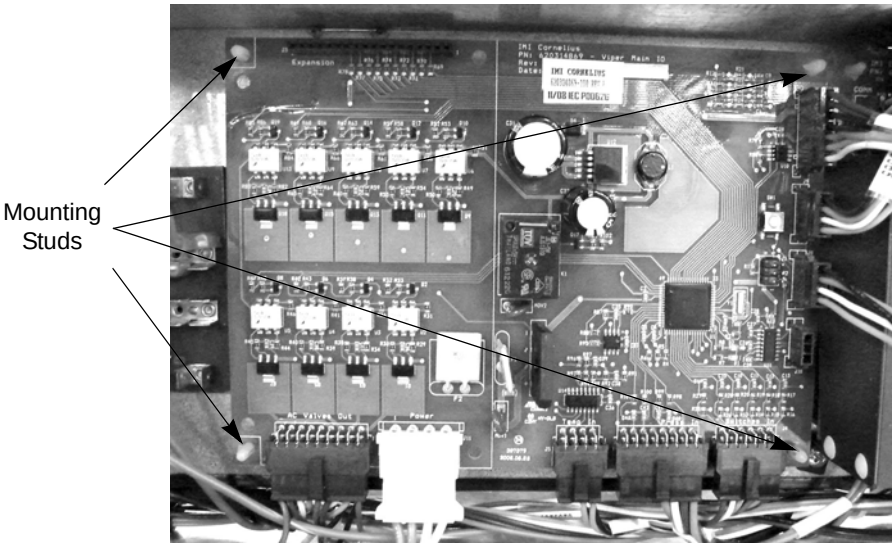

Figure 55. View of Control Board in E-Box

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Backward/Forward Compatibility with Older Software Versions

With version 3.0 software release several of the boards used to control the equipment will not be backward compatible with boards containing version 2.x of the software. Please refer to the table below for compatibility.

Table 59

Software Revision / Board Description	V2.x Part Number	V3.x Part Number	Backward Compatibility
User Interface - UI	620314871S	620314871-100S	No
Input/Output - IO	620314869S	620314869-100S	No
Motor Control	620314868S	620314868S	Yes
Status	620314874S	620314874S	Yes
Language Chips	629096930XX	629096931XX	No

The user interface (UI) board and the input/output (I/O) board must have same software version for correct operation. If the UI board and the IO board do not have the same software versions an error will be displayed on the UI. The error displayed will depend upon which board has 2.x software and has 3.x.Either “X BRL TEMP OUT” will be displayed or “H20 OUT” will be displayed followed 30 seconds later with “X BRL TEMP OUT”. If either of these messages is displayed after changing a control board check the software version. The current software version for each board can be found through the menu screen. Select, MENU, UNIT DATA, then press the “VER” key. The control boards will also have a label marked with the part number. A -100 suffix has been added to the part numbers for each of these boards to indicate version 3.0 software release.

The foreign language chips are software version dependent. Part numbers for software version 3.0 chips have the base number of 629096931 followed by an alpha suffix designating the language type.

The motor control boards and the main status board will still operate with either version 2.x or 3.x software of UI and IO board.

When ordering replacement/service parts for any unit check the software version of the UI and IO boards and be sure to order the correct board as listed in Table 59.

MOTOR BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The motor board is located in the E-Box, to the right of the control board. It is mounted to the panel on three (3) plastic mounting studs and a threaded stand-off, shown in Figure 55.

Table 60

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.

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Table 60

Step	Action
3	Unplug the eight (8) connectors from the control board.
4	Squeeze each of the mounting studs at the corners of the board while carefully lifting the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

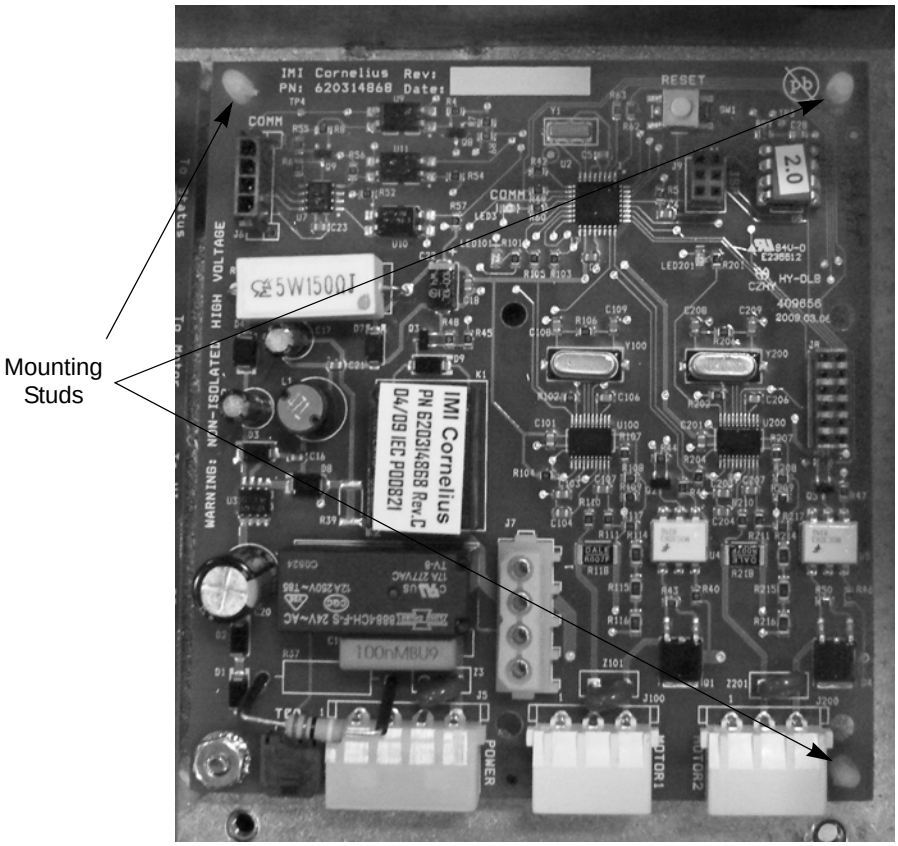

Figure 56. View of Motor Board in E-Box

TROUBLESHOOTING

TROUBLESHOOTING THE SYSTEM

Problem	Probable Cause	Remedy
Unit will not run.	A. Unit not plugged in. B. Circuit breaker. C. No power at L1 or L2 on contactor. D. Low voltage at T1 or T2.	A. Plug in unit. B. Reset/replace circuit breaker C. Check voltage at outlet. Check wiring to contactor. D. Replace the contactor.
“Sleep” display on barrel status menu.	A. Sleep time set. B. Clock incorrectly set. C. No wake time set.	A. Check sleep programming. B. Check sleep programming. C. Check sleep programming.
Barrel status OFF.	A. Not activated. B. Error has shut off motors. C. Unit in Diagnostics. D. Defective touch switch.	A. Turn to ON, DFRST or SPIN. B. Correct error & turn to ON, DFRST or SPIN. C. Exit diagnostics & turn to ON, DFRST or SPIN. D. Replace.
Low/High voltage ERROR.	A. Line Voltage out of SPEC (spec is 205-255 VAC for 60 Hz and 196-265 VAC for 50 Hz). B. Error range 180/260.	A. 1 - Check line voltage. 2 - Check T1/T2 with Compressor running. B. Correct line voltage.
Frozen Barrel	A. Low Brix B. Broken beater bar C. Broken drive coupler. D. No defrost. E. Are defrosts programmed all days?	A. Correct cause and reset Brix. B. Replace beater bar. C. Replace the drive coupler. D. Program defrosts in unit. E. Reprogram to all days.

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Troubleshooting Product Not Cold

Problem	Probable Cause	Remedy
Compressor not Running	A. Barrel not in ON mode. B. No voltage to compressor. C. Bad start components. D. Compressor's thermal overload protector "open". E. Open or shorted compressor windings. F. Bad control board.	A. Turn barrel to ON. B. Check power at contactor L1, L2 - T1, T2. C. Check components and wiring. D. Check resistance of compressor windings and check incoming line voltage. E. Check resistance of compressor windings. F. Troubleshoot, replace if necessary.
Compressor Running but not Cooling	A. Low refrigerant. B. Restricted condenser/filter. C. Condenser fan motor/blade defective. D. Hot gas valve leaking or open. E. Defective compressor.	A. Repair leak and weigh in new charge. B. Clean or repair. C. Repair or replace. D. Replace. E. Repair or replace.
Restricted Air Flow	A. Dirty filter. B. Dirty condenser. C. Damaged fins. D. Not enough "clearance" around unit.	A. Clean filter. B. Clean condenser. C. Repair/replace if necessary. D. Ensure proper spacing around unit.
Fan Motor	A. Bad connection B. Bad motor C. Cracked or bent fan blade	A. Check/connect B. Replace motor C. Replace fan blade
Hot Gas Valve	A. Miswired. B. Defective coil. C. Defective product delivery board.	A. Correct wiring. B. Replace coil. C. Replace.
No/Low Refrigerant	A. Leak.	A. Repair and weigh in new charge.
Sensors	A. Bad connection. B. Bad sensor. C. Sensor out of position. D. Defective product delivery board.	A. Correct wiring. B. Replace sensor. C. Reposition sensor and clip. D. Replace.

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